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A white hen sitting
On white eggs three.

PLATE IV.

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Yellow as yolk."

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A MONTHLY MAGAZINE AND REVIEW FOR THE SCHOOL-ROOM AND THE STUDY

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EDUCATION IN PARLIAMENT.—JUNE–JULY.

ON June 15, the Scottish Education Bill, which for three days had cantered calmly on through Committee of the House of Commons while mad gallops were proceeding at Ascot in the presence of many legislators who ought to have been at Westminster, came to a check and a temporary halt. Up to the present time of writing the Bill has not been resumed, and there are fears among M.P.'s from North Britain that the Bill's career may have ended altogether. By way of reassurance on that point, it is remarked that the Licensing Bill got a rest three weeks long; that the Budget Bill was sent back to stables twice; and that, when those two "dark horses" have completed their performances, a day or two will suffice for the rest of the Education Bill's running.

Nevertheless, the "chapter of accidents" at Westminster is always open, and is often as full of hair-breadth escapes and perilous straits as a sensation novel, and the reader who sees these words in print a fortnight hence will be in a better position to judge of the fate of the Scottish Education Bill than can be now the man who writes them. Moreover, at the present date of writing, the promised opportunity of debating the new Day School Code has not arrived; and in point of fact education in this session has suffered from the prevailing uncertainty, hesitation, postponement, and indefinite risks which have characterised the whole proceedings of the High Court of Parliament this year.

There are some signs of the existence—nascent, it may be, but still the existence—of a feeling among members of Parliament that education is a matter which might very well be removed from the category of party affairs, and be treated as a neutral and administrative subject. "Foreign affairs" and the navy have almost attained to that safe harbour, and why not education too? Nothing is more curious and interesting for the student of governments to watch at Westminster than the evolution and developments which go on in the British system of party government. The British Constitution, which the French and German philosophers in eighteenth-century days admired so much, may still be much the same as it was in outward appearance, but inwardly it has modified and greatly changed. The Scottish Education Bill, during the debates which have taken place upon it so far, was seen to be an instance of the way in which great subjects, treated without party spirit by the Government, can be treated without party spirit by the Opposition. There are now quite a few things in Parliament which it is *not* the function of an Opposition to oppose.

That is not yet true about education in England, however, and even less true of education in Wales. At the time when the Prime Minister announced his scheme of closure by compartments for the debates upon the Licensing Bill, he indicated that the Defaulting Authorities Bill was to see the light again, for the chastisement of the recalcitrant education authorities in Wales. There seem to have been some negotiations and bargainings set afoot to obviate the difficulties arising from the party spirit in Welsh educational matters, but these good offices and efforts appear to have failed. Semi-secret meetings of Welsh peers and M.P.'s of both parties with Lord Londonderry, Sir William Anson, and Mr. Morant were held in the "Moses" committee-room of the House of Lords—a room which takes its name from a fresco of the Hebrew lawgiver descending with the tables of the law in his hands, which was painted by Mr. Herbert, R.A., in his prime. But the upshot of these negotiations seems at present to be nothing more artistic and successful than the pictures which Mr. Herbert used to hang on the walls of the Academy in his old age.

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The Welsh M.P.'s have long demanded a National Museum for Wales. Edinburgh has a National Museum, Dublin has one, London has several, and why not Cardiff one for Wales? Here was the opportunity for a bargain! Let the Welsh councils administer the Education Act properly, and the reward be a Welsh National Museum, of course. Such a bargain might not be law, justice, or equity, but it would be statesmanship. Yet when an influential deputation went to the Chancellor of the Exchequer about the matter, he, poor, poverty-stricken man, could promise no money for a museum at all.

But there is another opportunity for a bargain. The demand for Home Rule has never been stronger in Wales than it has been in Scotland, though it must have been stronger than it is in Scotland if Scotland did not possess a Minister, law officers, an office, and an Education Department of its own. Now Wales has not one of these. Happy thought! Why not dower Wales with an Education Department, on condition of the wicked councils ceasing from troubling, and the weary Anson being at rest? If a Welsh Education Department is set up, with a distinguished and titled Welshman, formerly a certificated teacher, at the head of it, will not patriotic pride induce the Welsh councils to lavish rate aid upon the schools of the Ritualistic St. Aloysius, the Low Church St. Barnabas, and the Roman *Sacré Cœur?*

The end and issue of this proposal are not yet, and not yet can it be said whether a Welsh Education Department or a Defaulting Authorities Act will be the outcome. But all this adds interest and amusement to the observations of educational affairs at St. Stephen's, which the watcher from the gallery takes at long range. Meantime the administration of the schools in England takes its usual course; squire and vicar (though more vicar than squire) occasionally manifest a plentiful lack of sweet reasonableness about a school, and inch by inch the Board of Education, while seeming to buttress up the firm of squire and vicar, are really sapping and undermining it. Thus, for example, there is nothing in the parish school which the vicar of St. Aloysius cares about so much as the taking the children to church—the church of St. Aloysius—two or three times a week; and who shall say that it has not at least a calming influence on the children? But now, it seems, the vicar must give up that privilege; it is against the law, the very administrators declare who permitted it until a few weeks ago. "What is the good of carrying on the school at all, then?" demand the vicars of St. Aloysius, superbly indifferent to the mere temporal instruction of the children, the lambs of the Church.

So Mr. Halsey, M.P., chairman of the House of Commons Committee that selects the members for other House of Commons committees—Mr. Halsey, embodiment of the English squire—Mr. Halsey, type of the other partner with the vicar of St. Aloysius—solemnly puts down a question, a thing which the Halsey type of M.P. seldom condescends to do. Have or have not H.M. inspectors in the past acted in accordance with instructions from Whitehall when approving Voluntary School time-tables which contain provision for the attendance at church of children whose parents do not object to it on certain specified days during the "religious hour"?

Sir William Anson is seen behind the dispatch-box when he replies, and is heard to utter, with voice that trembles, that the Education Department *did* use to hold that attendance at church was not attendance at school—a statement which, by its excellent obvious common-sense, commended itself to a listening legislature. "But," Sir William went on, "that when children, with the consent of their parents, attended church instead of receiving religious instruction on the school premises, the Department used to hold that they should not be marked on the register while so absent. And as by-laws now usually require that attendance at school should be for the whole time for which the school is open, it seems to the Board of Education that the time-table should not contain any reference to arrangements which have nothing to do with school attendance, and instructions to this effect are being given to H.M. inspectors of schools."

Consternation of the Parliamentary friends of the vicar of St. Aloysius! Up springs Mr. Richards, M.P., formerly (it is whispered, perhaps incorrectly) a Welsh Nonconformist, but now a donor of stained-glass windows to churches of St. Aloysius, and "Have His Majesty's inspectors," he demands, "received instructions not to sign any time-table providing for religious instruction during school hours out of the school buildings? and if so, will Sir William say why such notification to His Majesty's inspectors had not been made public by the Board?"

Sir William, dimly seen again, but heard, replies that "The Board will very shortly issue instructions to their inspectors in regard to the taking of children to church during school hours, and it is not the general practice of the Board to make public the instructions which they issue to their inspectors, and they see no reason for making an exception in this instance." Collapse of Mr. Richards, triumphant retirement into greater obscurity of Sir William, and prayerful, woeful attitude of the vicars of St. Aloysius, excellent men!

But now a keen suspicion awakes in the breast of the observer. Is this not all a comedy? Is this not all devised to compel the adoption for the parishes of St. Aloysius of the Model By-law which the Board issued about a year ago, that fell so flat? The Model By-law, it may be remembered, provided that the registers need not be marked until just before the commencement of the two hours of secular instruction. The vicars of St. Aloysius, excellent blind men, took exception to that. So did—excellent blind men—the Nonconformists. The county councils and borough councils, with magnificent indifference, left the Model By-law alone. But now—

Maybe the vicars of St. Aloysius will now see that the Model By-law is just the thing for them. Maybe the Church and the councils will now see a way of giving "definite religious instruction" out of school hours to children of schools handed over entirely to public management. O deep and downy Board of Education! O dull and impercipient vicars and Nonconformists! O Halseys and Richardses! the observer sits aloft and sees, and smiles.

BY MANY HANDS.

"Quot homines, tot sententiæ."

FOR the first time we meet with a denunciation of the bull-fight made by a Spaniard, and in the interests of children. But it does not come from Europe. On the contrary, the cry has been raised in one of those Spanish-American states of which the Old World, after so many years, knows so little—Yucatan. The mayor of the capital, Merida, has been giving to his fellow-townsmen an opinion of these *corridas* which is marked, to say the least, by considerable vivacity. Knowing from experience the passion which all meridionals of Spanish blood import into their favourite pastime, *el Señor Alcalde* has given proof of considerable courage in thus placing himself boldly in a minority of one against the national sport. In Yucatan, as in Europe, children, women, girls—whole families—attend the bull-fight, just as in a northern country they might go to a pantomime, with this difference that the pantomime is horribly real, and scenes of frightful brutality and bloodiness are enacted under their eyes. So far from exciting the sentiments we northerns experience, habit makes these sanguinary spectacles powerless to stir any feeling of pity, and popular passion roots the taste for them in all classes.

A Denunciation from Yucatan.

JUST like the children whom Mark Twain saw in Switzerland playing at guides and doing a blood-curdling ascent of a manure heap, we have seen boys in Spain performing in their games all the scenes and actions of a *corrida*—proof, if any were needed, of the sort of emotional effect these exhibitions have on the tender and impressionable minds of the young. The Yucatan mayor is quite right: they are an education in cruelty, in hardening the heart against suffering, and a development of the most bestial of all our instincts—the carnivorous delight in spilling blood. Some say they are a training in courage. Certainly, much coolness and skill are required by the actors, but everything is done to shield the human, and to hamper and weaken the beast, so that the "school of courage" apology for the bull-fight is not a very powerful one. After all, the comparison made by Basques, when speaking of their own national game, is pretty just: "*La pelota, juego de hombres; la corrida, juego de animales*" (the *pelota* is a man's game; the bull-fight a beast's). And children have no business there.

Babies at the Bull-fight.

WHILE talking of Spanish America, a notice made by a Cuban pedagogue comes to mind. Since the Spanish-American War great efforts have been put forth to originate and carry out an educational system for Cuba. Its promoters are finding out that all is not rose-coloured; that pedagogy is not a science, nor a nostrum, but rather an art, and an art which consists in subtly fitting methods to special needs. For instance, the Cuban, like all natives of the tropics, has a nervous system constantly superexcited by the conditions of his climate; a rich and strong imagination whose flight nothing arrests, but which in its caprice makes it very difficult to give a fixed direction to the mind, which latter is the result of a definite exercise of will power. It is not for nothing that fantastic imaginings are called *châteaux en Espagne*—"castles in Spain," or, as we call them, "castles in the air." So that the psychology of the Cuban—fertility of imagination, excessive sensibility, feebleness of will power—calls for a special antidote in the way of pedagogical method. And this problem—what is this muchly desired and very special method?—confronts our Cuban *confrères*; and if they would succeed they must solve it. The point is of interest, as showing once again that pedagogy, considered merely as academic theory and bookwork, is useless to surmount the difficulties daily experienced by the teacher. It is rather "the art and practick part" of education, which "is made the mistress to this theorick," to borrow a phrase from the ever-appropriate Shakespeare.

Cuban Psychology.

READERS of the *Practical Teacher* are familiar with the name of M. Demolins, the author of the startling book on the basis of the superiority of the Anglo-Saxons, and of another, equally laudatory, on *L'Ecole Nouvelle*, in which he analysed the methods of the English secondary schools, and ended by declaring his intention of founding one in Normandy on their model. Des Roches (the name of *L'Ecole Nouvelle*) has been in existence for some short time, and it would be interesting to hear from M. Demolins himself what measure of success has attended his experiment. We find that four others have sprung up, of the same type—le Collège de Normandie, l'Ecole de l'Ile-de-France, l'Ecole de l'Esterel, and l'Ecole du Sud-Est. The experiment is a noteworthy event, and one which has peculiar claims on the attention of Englishmen. But we don't yet know enough about the schools and their doings to say whether the phrase of the Frenchman who has been writing about them in *La Revue Universelle* is justified—that in these schools is being inaugurated "the virile education that the new age demands."

Olla Podrida.

THE nuisance of the Tower of Babel! Comic enough are its effects in the classroom when the guileless English child wrestles with a foreign idiom; comic also when the simple foreigner treads unwarily among the pitfalls of our mother tongue. A Provençal of our acquaintance, who insisted on returning alone to a suburb of a northern town, called Fallowfield, disrupted the traffic considerably by boarding trams and inquiring distractedly for "Filofal!"—becoming eventually a confirmed pessimist with regard to the English language. Another acquaintance, a Norwegian, better equipped, convulsed his audience by describing an accident in which a common acquaintance, with much difficulty, "returned to conscientiousness!" though there was no intention of blackening the victim's character. In the same town is a professor, a miracle of erudition on "physiological phonetics," whose habitual greeting after a few days' absence is, "And your health is restituted! Yes?" But the masterpiece is the announcement of a fruit-exporting firm at Burriana, on the eastern shores of Spain, the *aprica litora* of the Latin poet, that they supply only "most greater to selec oranges!" Puzzle me out that, and explain if you can the curious mental backthrow which has produced it. There is a grand time ahead for Esperanto! But though we may smile we

can't grumble, when an English girl student of mature years described the other day the three kinds of rocks as *sedentary*, *ingenious*, and *metaphoric!* Physician, heal thyself!!

N.U.T. NOTES.

BY suspending the standing orders in order to conclude the business, one session sufficed for the last meeting of the Central Council of the Benevolent and Orphan Fund of the Union. The new Council has soon settled down to its proper *métier*, and *work* rather than *talk* seems to be now the order of the day. This is, of course, all to the good; and, as one of the Council, I venture to hope that this eminently sensible practice will remain with us until the end of our year of office. Mr. Bickerton was thoroughly happy in being able to report the receipt of substantial amounts, forwarded during the past month, as the result of various "special efforts" in the country. The largest of these were: (*a*) Croydon — Bazaar, £88, 17s. 10d.; (*b*) Burton-on-Trent—Operatic Society and Concert, £53, 12s.; (*c*) Bath—Concert, £41, 1s. 3d.; (*d*) Anglesey — Concert, £29, 5s.; (*e*) Chelsea — The James Hodge Memorial Fund, £25. Very hearty congratulations and letters of thanks were voted to all who had been responsible for the good work; and due recognition was given to the Local Boards of Leicester, Woolwich, Northampton, and Scarborough, which, by means of rummage sales, jumble sales, concerts, and "Easter offerings," had been able to forward £7, £8, £8, 8s., and £6 respectively. The Council also learned that £185 had been realised in Leicester by a sale of work, and this further proof of enthusiastic and continued interest in the fund afforded the liveliest satisfaction. By the way, when declaring this little bazaar open, the Mayoress of Leicester paid the teachers a graceful compliment, which was thoroughly deserved. She stated that the teachers were worthy of all the support outsiders could give them in their efforts to raise money on behalf of their B. and O. Fund, *because they themselves were always so ready to help in all charitable causes in the town. They did so much for others, and especially the children of the town, that others must come forward and help in return.* This applies not only to Leicester, but to every part of the kingdom, where teachers are to the fore in benevolent and philanthropic work. Most encouraging reports were submitted by the Organisation Committee of the Council, showing, *inter alia*, what the Llandudno Conference Committee hopes to effect next year. Wales, which used to be content with a very lowly position, has, since the advent of Mr. Phil. Thomas to the Council, made up her leeway very rapidly, and with a Welsh president and a Welsh conference, high-water mark will most certainly be reached at Easter, 1905. Executive members, as they go about the country, are amongst the fund's most valuable missionaries.

"B. and O." Council.

THE last sentence of the preceding paragraph reminds me how important a part of the work of the Executive's Organisation Committee is that referring to "deputations." At every meeting requests are before the Committee for the presence of some member (or members) of the Executive, and occasionally there is considerable discussion before a decision is arrived at. If an association has had no deputation during the preceding twelve months, and the member asked for be one of the "supervisors" (as the representatives of the various electoral districts are called), the request is granted automatically, being according to the rule laid down many years ago. Often, however, an outside member is asked for, and then may ensue a pretty little discussion, the quidnuncs wanting very properly to know the "why and wherefore" of it all. My ten years' experience has shown me that the gentlemen in most general demand are the M.P.'s (Dr. Macnamara, Messrs. Gray and Yoxall), and the president and vice-president of the Union. After these come the aspirants for vice-presidential honours, the associations wishing, naturally enough, to make the acquaintance of the men likely to be at the helm two or three years hence. Some of my colleagues on the Executive hold very strong views as to the propriety of allowing these last mentioned to tour the country at the Union's expense, and there is something to be urged for their point of view. My own opinion is that, in the long run, it is the best policy to grant leave for a visit from the member the association prefers. In days gone by the Committee used to try to "save its face" by referring all requests for outside members to the supervisors, and these invariably had the good sense to accede to the wishes of their constituents. They understood perfectly well that if the associations wished for *them*, they would ask for them; if they were not wanted, it was the quintessence of folly to attempt to force one of the supervisors on a reluctant association. Further, no man or woman with a vestige of self-respect would undertake to go where he realised that his or her own presence was a secondary consideration. For ladies' "at homes," Miss Cleghorn appears to be first favourite; whilst amongst the class teachers, that splendid specimen of physical manhood, Mr. J. J. Cullum, the president of the N.F.A.T., at present has the call. Looking back on my own public career, I am inclined to think that the best speeches—if I may use the term without egotism—I ever made were those delivered during the two years I was before the country as a candidate for the vice-presidency. Every member serving as a deputation is required to furnish a report of his visit, and in this way the Executive receive at first hand reliable accounts of the state of Unionism throughout the country.

Deputations.

'TIS a thousand pities—and it's no use blinking the fact—that ordinary teachers' association meetings are attended very poorly indeed. A special "whip up" of both members and non-members is usually made when one of the Union's "big guns" visits a locality, but in the main the percentage of faithful adherents is so small as almost to drive the hard-working secretary and his committee to despair. "Why is this?" one may ask, and the correct answer is not readily forthcoming. I have heard times without number the reason alleged that "teachers' meetings are so dry." Yet they ought *not* to be dry, did the members of the Union take but a normal interest in the educational and professional questions of the hour. Time after time have the Executive sent down to the associations important schemes dealing with organisation, methods of election, and new developments of Union policy; and what has happened? Well, at least fifty per cent. of the associations are content to ignore whatever is sent down for their consideration, whilst of the other fifty per cent.

Teachers' Meetings.

perhaps one member in ten will take the trouble to express an opinion either for or against a particular policy. The consequence is that the management of every association falls quite naturally into very few hands—the hands of the men and women who will devote a little space to a thoughtful examination of the proposals submitted. I confess that I know no plan for *compelling* an interest in Union politics, although if the "sleeping partners" could only be induced to attend now and again, this interest might be gradually developed. More might easily be made of the educational side of our profession. In every county there exist men and women who are experts in one special subject, and although "shop" may be anathema to the average teacher, still we all have something to learn. Quite recently I had the pleasure of seeing one of the largest halls in Nottingham packed to the very doors, with an enthusiastic audience who had come to hear Mr. T. P. Sykes's popular lecture on "Practical School Music." Not a single man or woman left that hall without feeling benefited from the eminently useful and suggestive hints thrown out by Mr. Sykes; and what he can do for music, plenty of others can do for the various subjects of the school curricula. Then, again, men distinguished in science, literature, and art are generally willing to give addresses on some topic with which they are *au fait*, if sufficiently long notice be given them. An unfailing "draw" is H.M.I. In fact, it is noticeable and significant that although the visit of an archangel might possibly fail to attract certain self-satisfied individuals, a speech from H.M.I. is a sovereign specific for apathy and lethargy. In the counties, I imagine that a sight of the new educational "Directors" would everywhere enforce almost a record attendance.

* * *

County Associations.

IN former days what were termed "District Unions" existed in various parts of the country, and so far as my personal knowledge goes, those bearing the names of the West Yorks. D.U. and the Midland D.U. were easily ahead of all others on account of the energy, zeal, and ability with which their affairs were conducted. But *autres temps, autres mœurs;* and the passing of the Education Act of 1902 has entailed the passing of the District Unions, and in their stead we have County Associations of teachers, which are likely to be infinitely more effective and useful than the organisations they supplant. At the end of last year forty-four County Associations had been already formed, and, in all probability, before 1904 has closed upon us every administrative county will have its association ready to deal with matters of importance and difficulty whenever they arise. The financing of these County Associations is a subject almost constantly before the consideration of the Executive. In the past liberal grants were made to the District Unions, under certain easy conditions, the chief of which were:—1. That when considered necessary by the Organisation Committee of the Executive, and in no case less than once a year, the District Union Committee shall convene a conference of the secretaries of local associations comprised in the District Union, for the purpose of considering and promoting Union organisation in the district. 2. That during the year a public meeting of an educational character, organised by the District Union, be held at some convenient centre, the expenses of which shall be borne by the District Union. 3. That each District Union shall attempt to form new associations at the suggested centres within its area. 4. The District Council shall meet not less than twice in each year. These conditions having been duly fulfilled, the Executive, on the presentation of a properly audited balance sheet and the necessary vouchers for expenditure, used to make grants equal to one-half the expenses of the District Union on the year's working; but these grants could not ordinarily exceed sixpence per member on the number of members in the District Union for the preceding year. A few months ago the Executive agreed that threepence per member should be the contribution to the County Associations' expenses from the central exchequer. On the motion, however, of Mr. Winfield, this decision has been cancelled, and the whole subject is again in the melting-pot. My own very strong view is that the associations ought to raise locally all the funds necessary for carrying on these new organisations, and for at least two reasons. First, the locality reaps directly the reward of their labours; and secondly, the general fund of the Union cannot bear the strain (on the present subscription) of this new expenditure. If, however, the Executive *must* give subventions, I would make these in direct proportion to the amounts raised in the various localities, and I intend to press this view at Russell Square.

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A By-Election.

LANCASHIRE has sent many "strong men" to Bolton House, as readers of the *Practical Teacher* all know. The county palatine gave us Mr. Waddington, incomparably the best debater the Executive has ever possessed; and Mr. Ernest Holden, who now fills a responsible position in Rochdale with equal satisfaction to the Authority and the teachers. Later on came Mr. John Wright of Liverpool, whose multitudinous local duties compelled him to retire last Easter, to the great regret of all who know a "straight" man, with the ability and courage to state clearly his convictions, when they see him. At the May Executive meeting, Mr. J. R. Sparrow tendered his resignation on taking up an appointment as Inspector of Schools in the borough of Salford. He had been with us only a year—quite long enough, however, for his colleagues to see in his quiet, repressed manner a reserve of strength likely to prove eminently useful in his new sphere. At the by-election, caused by his retirement, four candidates presented themselves, with the following result:—

Alcott, Thomas	1,462	votes.
Sidebottom, Albert J.	954	,,
Bradley, James	881	,,
Hughes, William H.	681	,,

Mr. Alcott was heartily welcomed by the president on making his *entrée* at the July meeting, and those who know him best predict for him a useful career as a member of the Executive.

* * *

Promotion of Mr. Shawcross.

I AM always glad when a class teacher who has striven zealously and successfully on behalf of his fellows receives one of Fortune's smiles, and it was with especial pleasure that I heard the news of the promotion of Mr. Shawcross, B.A., to the charge of one of the Council Schools in the city of Manchester. His one regret is that he has not remained a class teacher long enough to go through the chair of the N.F.A.T., but in these days one cannot exactly choose the hour

of one's translation to what some humorist once described as the "upper house." It is natural and inevitable that the Assistants' Federation should be constantly parting with its leaders; and it is at the same time strikingly significant of the quality of the *personnel* of the Federation that every resignation is filled by the election of a newcomer quite as capable as his predecessor. A. C.

NOTES FROM THE NORTH.

I HAD anticipated that ere my last Notes were published the Scottish Education Bill of 1904 would be an Act, but on account of the amazing interest aroused in some of the provisions, which, be it said, many of us considered non-contentious, the three days devoted to its discussion during Ascot week were only found sufficient to dispose of some thirty out of its sixty clauses. So that it can hardly be said that the Bill is yet out of danger. The amendments to the remaining clauses number no fewer than 600, and, together with new clauses proposed, occupy no fewer than twenty pages of the orders of the day. But there is reason to believe that the Secretary for Scotland is so anxious to have the Bill become law before the end of the session that he is willing to compromise on more than one point. On the Establishment of Provincial Councils, Clause 43, for example, there are some forty-one amendments; but the proposal which Mr. Graham Murray now puts forward, I understand, is to give the statutory right for appointment by the council of a joint committee, and to endow these bodies with useful advisory functions. It is expected that this proposal will considerably ease off this clause.

The Scottish Education Bill.

THERE can be little doubt that the prospects of the Bill passing into law are not so rosy at the time of writing as they were immediately after its introduction. The political atmosphere is at present somewhat clouded. The barometer is standing very near "stormy." The great amount of discussion that has been engendered over the various clauses of the Licensing Bill, and the application of the guillotine to ensure its passing, have both caused a considerable expenditure of time. The Licensing Bill is to be succeeded by the Budget Bill, so that it will be at least the last week of July before the Bill is again taken up. If the Lords develop their discussive and discursive faculties to any great extent, the advent of St. Grouse's Day will see the Scottish Bill of 1904 left stranded. It would be a thousand pities if such were to happen. But how frequently has it been the case that a Bill which was received at its introduction with an almost unanimous chorus of praise has been wrecked on the shoals of helpless indifference or on the rocks of obstructive criticism! But perhaps in the present instance the helmsman is too careful to allow either of these contingencies to happen. So mote it be.

Will it Pass?

THE Bill in its original form proposed to adopt the local government districts as set up by the Act of 1889. But as the result of the discussion in Parliament, this plan has been considerably modified. On representation being made not later than the 25th of October 1904, by a county council, or district committee of a county council, or by a town council, or by an existing School Board, and from time to time after the commencement of the Act by a School Board, the Secretary for Scotland may determine that any two counties, or any two or more local government districts in any county, shall be combined into one district, or that any county not divided into local government districts shall be divided into districts. So that it is not possible definitely to say what the areas shall be until the end of October. There is no doubt that intimate local knowledge of educational wants will thus be given an opportunity of showing what is best for the district. Teachers will thus have an opportunity of making suggestions through their School Boards, and it is to be hoped they will take advantage of this opportunity, both for the sake of the education of the district and of themselves.

The Educational Area.

CONSIDERABLE change has also taken place on this in the enumerated districts. Clause 6, Sub-section 2, of the original Bill proposed that the members of the School Board for every enumerated district were to be elected in each municipal ward of every burgh; but now it reads that they are to be elected in each burgh embraced within such district, and any division of such burgh into wards shall not have effect for the purposes of such election. This will give minorities a chance of electing members to the School Board. Some think it is almost a return to the old failing of cumulative voting. On the other hand, it may be argued that election by wards left a very open field for wire-pulling and political agitation. Whether this will be obviated or not remains to be seen. But there can be little doubt that when education becomes the catspaw of politics; it is not to the best interests of education. It will give ladies, too, a better chance of success, and it is admitted that lady members of School Boards are an essential in our present-day education.

The Electing Body.

THE question of managers in non-enumerated districts was one on which the Institute had somewhat pronounced opinions. In Clause 20, as originally framed, the managers were to consist of one-third appointed by the School Board, and two-thirds appointed by the town or parish council. As the Act now stands, the managers shall include a member or members of the School Board representing each electoral division, or burgh, as the case may be, in which such school is situated. The teaching profession of Scotland are at present congratulating themselves on the results of their great efforts in this matter. It is evident from the discussions in Parliament that the Institute had not a little to do with it. One member said he supposed every member had received a telegram from the Educational Institute of Scotland asking him to support the clause as to managers as amended by the Secretary for Scotland. At the same time he pointed out that he had received letters from teacher voters in his constituency. It is to be hoped that the passing of this clause means that the appointment and dismissal of teachers will be in the hands of the School Board, and not be delegated to the managers.

The Management Question.

PROFESSOR DARROCH, of Edinburgh University, in a very interesting letter to the daily press on

the training of teachers, deprecates the establishment in Edinburgh of a local committee. His objections to this are that the status of existing training colleges would be lowered. "Compelled to receive a larger number of the less highly qualified students, and deprived of the stimulus of the better qualified university student, the inevitable result would be that the teaching would suffer, and that the student would lose the educational influence exerted by his better qualified fellows. Again, the tendency would be to create a division—an undesirable division—between the two classes of students and teachers, the university trained elementary teacher, and the training college teacher, and such a division amongst a body of men and women who in after years are to co-operate together in the education of the youth of the country cannot be productive of good. Lastly, the university and the training colleges, instead of working harmoniously together for the securing of the efficiency of the teacher, would be placed in a position of antagonism, competing the one with the other for the favour of the student, the matter being ultimately decided in favour of the body which can offer the greater material advantages."

Training of Teachers.

* * *

I VENTURE to think that Professor Darroch has not made out his case against the appointment of a local committee in Edinburgh. At present the students attending our training colleges are classed as non-university and university students. The very thing he deprecates is taking place. The university should be the institution at which all teachers should be educated. The training colleges are no longer a necessary part of our system. The model schools attached to these institutions are, as a rule, not the best provided with educational appliances, and this not because the managers of these schools are unwilling to provide them, but they have not the necessary money. Schools which have been endowed with all the modern improvements in classrooms, apparatus, etc., are usually built at the public expense, and would form the best training places for schools. My opinion is that all future teachers should be trained at the university during the winter session, and should, during the summer session, get their practical experience in school work. No one who knows the matter thoroughly will admit that the future teachers are gaining much practical skill in teaching under the present conditions. There is a need of co-ordination in the training of teachers, and this could easily be done in the way I suggest. The provincial councils could safely be entrusted with the training of teachers, and as a result the various existing means could easily be unified under that body.

Do these Objections Hold?

* * *

I HAVE just received a copy of the annual report of this association. The past year has been one of hard and earnest work, as is evidenced by the report of the Federation Council. The membership has largely increased during the past year, and the fine spirit of unionism which now prevails through the teaching profession finds expression in this large accession to the ranks. Only one branch shows a decrease, and the decrease only numbers one. The membership now stands at 5,258, as against 4,711 in the preceding year, or an increase of over 500. The report says:—"The rapid increase in the membership of late is striking testimony of the satisfaction with the work of the organisation, felt by many of the class teachers throughout the country, though a more tangible proof would be an enthusiastic endeavour on the part of every member to induce those still outside our ranks to join. If we can but keep up the present rate of increase for a few years, our membership would practically coincide with the number of class teachers engaged in the public schools of Scotland."

The Scottish Class Teachers' Association.

* * *

THE question of corporal punishment has been more in evidence during the last few months in Scotland than it has been for years. Numerous cases have been brought into court, but in all of them, I am glad to note, the teacher has been upheld in the discharge of his duty. The latest publication, *Erchie, My Droll Friend*, has a chapter on the subject, part of which I may be allowed to quote.

Corporal Punishment.

"'But the teachers don't understand him [wee Alick]?'

"'That's the hale p'int,' said Erchie agreeably; 'the teachers never dae. They're no' pyed [paid] for understandin' a' the wee Alicks: a' that can be expected for the wages the schoolmaisters get in Gleska is that they'll haul the wee cratur by the scruff o' the neck through a' the standards. The schoolmaister and the mither ought to be mair prized and bigger pyed than ony ither class in the country, but they're no', an' that's the reason their jobs are often sae badly filled up.'"

Is this a plea for larger salaries for the teachers of Glasgow?

MENTAL BACKGROUNDS.

BY J. ADAMS, M.A.,
Professor of Education, London University.

Suggestion—(*Continued*).

ON the other hand, given a background, and we have no hesitation at all in predicting the exact sense in which a word will be accepted. The background, then, is of the utmost importance in suggestion. Indeed, suggestion often implies nothing more than calling up an appropriate background. The mind does all the rest for itself. This indeed is a fundamental principle in the scientific use of suggestion. Let the mind do as much of the work as possible. Why is suggestion regarded as so much more dangerous in morals than direct statement or demonstration? It is because suggestion merely starts a process; the mind carries it on, and in carrying it on it believes that it is acting from its own initiative. There is nothing so pleasant in mental process as self-activity; and if the mind can be made to feel that it is working out its own processes in its own way, it works much better and more effectively.

In using suggestion, then, we must seek out the *minimum suggestibile*. It is sometimes discussed how much of a given idea must be presented before the whole is suggested to the mind. There can be no quantitative answer. We have no standard. Everything depends upon our familiarity with the object in question. As a rule, we cannot say what it is that suggests the object. It does not come to us piecemeal,

but as a whole. Going along a crowded street, we find ourselves thinking of a certain friend. Suddenly we look up, and there he is, a few steps in front of us. If we are asked how we knew it was he from the mere appearance of his back, we find it difficult to say; and what we do say, remember, is pure theory. The fact that it is we who have seen and recognised the man gives our evidence no more authority than that of any one else. For the recognition was not made consciously. Very probably the peculiarities that we select as distinguishing our friend had little to do with our recognition. We did not observe this thing and that, then reason out that it must be so-and-so. So-and-so sprang ready-made into our consciousness.

The fact seems to be that if the different elements of a complex idea are firmly welded together, that idea can be suggested only as a whole. If we wish to recall the idea of a cow to the mind of another, we can do so by appealing to various senses; but so soon as the cow appears, she appears as a whole. It is not a matter of one part appearing and being followed by each of the others. Further, the cow that does appear is always the same cow for the same mind. We have all only one available cow as idea. This idea may be roused at any moment by the sight of the word *cow*, or the pronunciation of that word, or the lowing of some unseen animal, or the peculiar odour that we associate with cowsheds, or the sound of a peculiar kind of bell. The resulting cow in our minds is the same. No doubt this ideal cow is capable of improvement. Increased experience of cows gives the idea greater content. But this does not affect the work of suggestion. The important point to remember is that suggestion can recall only what is already there. It is absolutely helpless to make any change in the content of the mind. Any tramp can certainly suggest things to our mind whether we will or not, yet he can suggest nothing that was not in the mind before.

It has to be remembered that suggestion may be used for good purposes as efficaciously as for evil. Only one side of the truth is crystallised in the lines:—

> "How oft the sight of means to do ill deeds
> Makes ill deeds done!"

The teacher may suggest a line of good action, and his suggestion may be quite as irresistible as in the case of evil. No doubt we are, on the whole, more prone to evil than to good. But I wonder whether evil suggestion does not owe some of its power to the unostentatious way in which it is presented. Those who suggest evil have usually the grace to be a little ashamed of themselves, and to do their suggestion furtively. May it not be that exhortation to good loses much of its power because of its directness and plainness, as compared with the veiled suggestion to evil? Is it not just possible that we have too much house-top proclamation? It almost looks as if evil were monopolising the teaching of the still small voice.

Consider the conversational bore, and learn of him. Thackeray speaks somewhere of the dull man who hears a remark the full bearing of which is beyond him at the moment. After an interval of about five minutes, the implications of the remark (obvious instantaneously to a mind of average quickness) develop themselves in this slow mind. The bore is too stupid to know that the meaning he has newly discovered was implied in the remark, and calmly enunciates the implied truth as something he has just thought out for himself. This is very aggravating for the person who made the original remark; but observe the satisfaction of the stupid person, and learn from it. He owes his satisfaction to the belief that he has worked out the meaning from his own inner consciousness; his joy is the joy of self-expression. Now your really clever man does not grudge to the stupid man this joy, however little justification it may have in fact. The teacher should adopt the same attitude towards his pupils. If he can suggest particular lines along which the pupils' minds may travel, he should be delighted to regard as "original" what he knows to be suggested. The advantage to the pupils is great, and that ought to be the only matter important to the teacher. In carrying out this line of work it is obviously of the first importance to find what is the least amount of suggestion that is necessary to initiate a given line of thought or action. The more inconspicuous the suggestion, the more likely is the mind acted upon to believe that it is working freely, and from its own initiative. An excellent plan is to divide suggestion—that is, to present its elements at different times. The different parts, if presented together, would at once lead to a particular conclusion. If presented at different times, the mind operated upon has the trifling work of putting the elements together and drawing the obvious conclusion. This is the usual method of the skilful perverter of minds as represented in fiction. "Putting two and two together" is the familiar phrase of the cunning stupid person who is following a line of thought carefully prepared for him by a superior intelligence.

In the romance of mystery and crime so popular at the present time, it is interesting to note the uniformity with which the writers work. At the beginning of the tale suspicion is made to point strongly in one direction. This the experienced reader knows at once to be the wrong direction. By-and-by another character, who was only slightly suspected at first, becomes the centre of suspicion; next the suspicion shifts to a third person; and so on the plot works till the mystery is solved. From our point of view, the interesting thing is the method of rousing the suspicion of the reader regarding each person. In a skilful story this is never done directly; the author, indeed, seems anxious that you should not suspect this particular person. But an apparently insignificant suggestion is made here, another there, and naturally the accumulated force of suggestion produces its result. The author's attitude of impartiality is essential to the proper working of suggestion. If there is any suspicion, however slight, that the author wishes the suspicion to go in a certain direction, that is precisely the direction in which suspicion refuses to go. So much is this the case that the more alert writers now vary their plan by making suspicion fall in the first instance upon the actual culprit. This at once frees the guilty person from real suspicion, in the mind of the veteran reader, and thus gives the writer a chance of ending with a genuine surprise. All this illustrates how exceedingly sensitive the process of suggestion finds the mind. To have its full power it must work unconsciously.

So insidious is this process of suggestion when used skilfully, that in the courts what are known as "leading questions" are not permitted. But so fine are the shades of suggestion that there are continual disputes as to which are and which are not leading questions. It is obviously unfair to allow the counsel for the prosecution to ask,—

"You saw the accused after committing the deed cast the instrument over the bridge?"

All that the witness saw was a man throwing something into the water. The question suggests that this man was the accused; that the accused had committed the crime with which he was charged; that the thing he threw into the water was the instrument with which the crime had been committed. All this is so plain that no lawyer, however unscrupulous, would venture to ask such a question. But a skilful cross-examiner does not usually confine his suggestion to one question. No single question can be described as "leading," yet the cumulative effect of several questions leads inevitably to a certain suggestion that is all the more powerful because it is so indirect. The mind of the witness follows all the more readily because it does not perceive that it is being led.

What is illegitimate for the cross-examiner is laudable in the teacher. Leading questions of the more palpable kind are to be avoided in the classroom as much as in court. To supply all the essentials, and leave to the pupil nothing but the filling in of the interstitial padding, is not teaching. It is legitimate to ask a pupil, "How do you prepare oxygen?" but the sort of thing that follows cannot be allowed: "To prepare oxygen you would get some chlorate of potassium, wouldn't you? and a little black manganese oxide to help the process, eh? And what would you do then?" The pupil cannot help adding, "Put them in a retort and apply heat." It is the mere completion of a process already started. By the laws of redintegration he would have a difficulty in *not* adding the rest.

Yet in another way the teacher's questions should be leading questions—not perhaps individually, but, as in the case of the cross-examiner, the interrogatory, as a whole, should lead to a definite point known beforehand to the teacher, though not to the pupil. This is the special characteristic of the form of teaching commonly misunderstood under the name of the Socratic method. By the very nature of his theory of knowledge Socrates had to regard all his questions as leading questions. If teaching was only a process of aiding recollection, it was clear that all the teacher had to do was to lead out things that were already in the mind. Socrates maintained that he never told his students anything, but merely made them discover things for themselves. It is true that he distinguishes in practice between merely verbal knowledge and real knowledge. He feels that he cannot suggest technical terms. In the *Meno* we find him saying to the slave boy,—

"And that is the line which the learned call the diagonal." This is pure dogmatic teaching. But he hastens to add the distinctly leading question, "And if this is the proper name, then you, Meno's slave, are prepared to affirm that the double space is the square of the diagonal?"

Naturally the boy can do none other than give his usual satisfactory reply, "Certainly, Socrates."

There can be nothing more interesting for the intelligent teacher than to present a given series of facts in such a way as to lead the pupil to come to a given conclusion. There can be no better test of the skill with which matter is presented than the loyalty with which the pupil answers to the implied suggestion.

One important point has to be noted here to prevent serious misunderstanding, particularly in connection with moral training. Suggestion works positively, not negatively. Suggestion should always take the form that leads to action, not that which should lead to inhibition. *Do this* is the true form of teaching. *Don't do that* is a phrase full of danger. Experience proves that so far as suggestion is concerned, the *not* of a prohibition has very little power in comparison with the positive force of the action suggested. To tell a child not to fidget is only to increase his desire to fidget. This principle was well understood by a former Principal of the University of Aberdeen, who, during a town and gown row, saw the gowns getting the worst of it, and came to their rescue with the prohibitory injunction, "You must not use the railings of my garden as clubs." The picture of a capital set of weapons was all that was suggested by the old man's words. The consideration of the little word *not* was held over for a more convenient season.

In this case the records all go to prove that the old gentleman knew exactly the effect he desired to produce, and was prepared to sacrifice his railings in a good cause. But very frequently a prohibition that is seriously meant has no other result than to encourage the forbidden action. We have to deal with two natural forces here. First, there is the fact of the positive suggestion of the action, which no negative particle can counterbalance; and there is next the "contrary" tendency, found in quite a large proportion of ordinary people in some degree, and in a small proportion in an excessive degree. Instead of girding against human nature because of its weaknesses, the teacher should make it his business to use those weaknesses for his own purpose, which is the good of the pupil. An excellent general method of dealing with contrary pupils is to suggest a conclusion that is only partially true, taking care at the same time that certain other facts are within the pupil's knowledge, these facts being such as to contradict the partial conclusion and suggest the true. The nature of the pupil leads him to question the conclusion suggested on the surface, while the facts already supplied really suggest the true conclusion. In this way the very weakness of the pupil is turned to his advantage.

Naturally this method demands a strong teacher; a feeble one cannot hope to handle such dangerous weapons with impunity. All which raises a very delicate point for our consideration. We have all along assumed that the teacher is the superior of the pupil, and in general this assumption is perfectly justified. But in very many cases on the side of the imagination the child is much superior to the teacher. We must remember that if

> "Shades of the prison-house begin to close
> Upon the growing boy,"

we, as grown-up people, have seen "the vision splendid die away, and fade into the light of common day." We have here a source of error against which we must be always on our guard, though, unfortunately, we can never have very clear indications of the actual line of error. The teacher who is most successful in his use of suggestion is he who has most perfectly retained his youthful point of view. In a certain sense it is more difficult for a teacher to be a child again than for the ordinary man. The teacher is often older than his years in respect of childhood. He is *blasé* on the subject, and finds it more difficult to deal with matters in a childish way. There are, in fact, two forces at work in making the teacher what he is. His experience of child-nature, his professional reading, and his natural or acquired sympathy with and for children, all tend

to make him a better man to deal with young folks than the ordinary layman. On the other hand, his familiarity with the matter taught, and the process of teaching, is apt to blunt his sensibilities. It is difficult to remember that the children of to-day are just as young as were the children of twenty years ago. The experienced teacher has always to be on his guard against the shame of saying over again the same things to class after class. Everything seems so dull and commonplace that your keener-witted master is inclined to seek out new and original ways of presenting things that are really better presented in the time-honoured way.

This caution is little needed by the ordinary humdrum teacher. The caution, indeed, ought to be all in the other direction. But the very fact that a teacher takes the trouble to consider such matters at all shows that he is of the kind that may need this warning. It is cheering to remember that however threadbare subjects are to the teacher, they are delightfully fresh to the pupils.

THE NEW REGULATIONS FOR TRAINING OF TEACHERS.

THE Board of Education has very wisely adopted the plan of publishing the regulations dealing with each branch of its work in a separate issue. Thus we have had the Day School Code, the Evening School Code, the Building Rules, and the Regulations for Pupil Teachers, and now we have a book of Regulations for the Training of Teachers, and for the Examination of Students in Training Colleges, as well as the Regulations for Secondary Schools, with which we deal elsewhere.

These regulations are drawn up on the same plan as this year's Code—that is to say, the arrangements are set out in plain language in a prefatory memorandum, and then given in detail in language which is intended to make technical points clear. The chief changes in the administration of the colleges are :—

1. The grants in respect to students who reside in approved hostels will be on the same scale as those made in respect to residential students.

2. A clear distinction is set up between the different classes of students. Those who follow the ordinary course of two years are called "Two Year Students." Those who have graduated or who have attained an approved standard of general education will be admitted for a one year's course, and be termed "One Year Students." Their work will be mainly professional; but if their previous academic work has been on special lines, they are to devote time to other subjects, so that they may become "all round" teachers. Much greater freedom is allowed in the conditions under which students of this class are admitted.

Untrained Certificated Teachers are offered a one year's course, and will be termed "Certificated Students."

Students of exceptional promise may, under special conditions, be admitted to certain colleges for a three years' course, leading to a degree as well as to the teachers' certificate. These will be called "Three Year Students."

In certain cases "Two Year Students" will be allowed to extend their training for another year. They will then be known as "Third Year Students."

3. The variable grants for Science and Art are to be replaced by a fixed grant of £3 per head per annum.

4. The regulation which required that a day training college should be in connection with a university or university college is withdrawn, and thus local authorities and others will be enabled to set up training colleges of a new type, in which this condition does not exist; and it seems to us that many of the pupil-teacher schools which have done such good work, and whose junior students are now being drafted into secondary schools, might develop at the upper end, and be recognised as training colleges under this article.

5. The arrangements for inspection of training colleges and for the examination of the students have been greatly modified.

With regard to the general tone of the Regulations, we are pleased to see an increased amount of elasticity and recognition of local needs. A high ideal of the preparation necessary for a teacher is set up, but we cannot help feeling that the ambition which many intending teachers feel to obtain a university degree receives rather scanty encouragement.

The advice given on the subject of professional training, both on the theoretical and the practical side, is sound, and shows a real desire to produce teachers who take a lofty view of their work.

The provisions for the examination of the Two Year Students, who, after all, will form the bulk of those with whom the Regulations have to deal, have been overhauled. After 1905 the permission to students to present a university examination as part of their certificate work will cease. The Board of Education will hold an examination which will be the general examination for students. A training college, with the approval of the Board, may examine its own students for their certificate, and arrange them in classes and in order of merit, and the Board will recognise such students as qualified for the office of teacher, but will accept no responsibility for the accuracy of the classification, nor for the comparative degree of merit indicated by corresponding classes in different college lists. Every year the Board will publish a list of newly-qualified teachers, and say how they have obtained their qualification. This list will show how the teachers have distinguished themselves in particular examinations, including the examinations in "Optional Subjects" held by the Board.

Detailed syllabuses are given at the end, and they include a choice of no fewer than five courses in the principles of teaching. Full instructions are given with respect to the buildings that may be used as colleges, and one appendix deals with the dietary of students. This is, in our opinion, very important; and if the directions are loyally carried out, many teachers would feel a pleasure in going through their training course again. Not only is it recommended that "students should have four meals per day," but "it is advisable that some form of flesh food—which includes eggs and fish—should be provided at another meal, preferably at breakfast." Moreover, it is even recommended that cake should be provided for tea, and that the light evening meal should consist of cocoa, milk, cheese, biscuits, and cake. So carefully have the regulations for the kind and the preparation of food been drawn up that we feel that if the college *économe* would, in addition, secure some fresh fruit whenever there is a glut of strawberries, etc., in the market, the students would be catered for in an ideal manner.

We are very pleased to see a table giving a list of the colleges, with their entrance fees, annual charges, etc. An authoritative list of this sort has long been wanted.

The Practical Infant-School Teacher.

A NEW GUIDE FOR INFANT TEACHERS.

IT is with very great pleasure that we introduce to our readers a new book by Miss Dodd, entitled "Nature Studies and Fairy Tales"*—a book which marks the highest development of infant-school work. It has long been recognised that if really good educational results are to accrue from the child's school course, a sound foundation must be laid in the infant school. In the past the teachers of infants have been many and earnest; few people have shown more devotion to their calling. They have not been without leaders, and speaking generally, infant teachers have made a careful study of their art, and have listened to the advice of advocates of reformed methods with a keenness which should cause many teachers in senior departments to blush. But yet for a long time they worked on wrong lines. At first they divided their work into water-tight compartments, and although no pains were spared in the efforts to make each individual lesson as perfect as it could possibly be, yet the lessons suffered from isolation. The very dissimilarity between one lesson and the one that followed it was thought to be the thing to strive for—"children would benefit by the marked change." Naturally enough, the child derived so little benefit from a lesson, that by the time the same subject came round again the effect of the lesson had passed away. Progress under such conditions was bound to be slow. Next came the period of confusion of subjects, and senior departments suffered perhaps even more than the junior from the desire to teach one thing in the time allotted for teaching another. This period was marked by the invention of history readers, geographical readers, etc., and the reading lesson was converted into a geography lesson of a kind. Both the reading and the geography suffered by this confusion, although perhaps the geography gained something from being presented in a narrative or descriptive style instead of as a list of names. From this confusion has been evolved the correlated system of teaching, in which each lesson is thorough and complete in itself, but yet is thrown into relation with others, and forms part of a harmonious whole.

The scientific study of psychology has been taken up, and the psychology of childhood has received special attention. As a result, it has come to be recognised that the two faculties (not using the word to denote water-tight compartments of the brain, but ways of showing mental activity) that are most conspicuous in children are imagination and observation. Children observe things that are, and imagine things that are not. If left to themselves, they grow up faulty observers, noting trifles and neglecting points of great importance, and their imagination too runs riot. The way to train and discipline these two powers is to provide them with the proper subject-matter, and hence the importance attached at the present day to nature study and to fairy tales. By a systematic study of simple natural objects and of phenomena that come within the scope of the child's daily experience, he may be trained into a skilled observer—be taught to notice wherein two bodies are alike and wherein they differ; to classify objects on the basis of some common characteristic, and by applying, removing, or modifying one condition at a time, to find out which is the efficient cause that produces a given result. And so, too, his imagination may be trained to become a most effective agent in his education, by leading him to recall images of things he has seen, and modify them so as to produce a faithful image of something he has not seen. As was set out in the article on the genesis of the fairy tale, many people hold that the fairy tale is a highly imaginative way of describing natural phenomena. Many legends and myths may thus be explained. The classical legend of Ceres, whose daughter, Persephone, was carried off and obliged to spend one-third of each year in the lower world, while she passed the rest above with her mother, is a beautiful representation of the seed-corn which is buried and afterwards grows up to nourish men.

The lessons in the volume before us are drawn from nature and from fairy lore. Each one is arranged in accordance with the Herbartian plan into five sections, and forms a model on which the teacher can draw up other lessons. But although each lesson is admirably arranged, its usefulness does not stop there. It forms part of an organically arranged system. There is a capital selection of good poetry, which is related to the scheme of lessons; and not only can the lessons be used as the basis of material for oral composition or conversation lessons, but the book shows how children may give expression to the thoughts suggested by these lessons, in the lessons on drawing, whether they use the line or the coloured surface. With Miss Dodd's kind permission we give four chapters *in extenso*.

* T. Nelson and Sons. Price 3s. 6d.

"NATURE STUDIES AND FAIRY TALES."

CORRELATION.

RECENT changes in our methods of teaching little children have chiefly been in the direction of simplification. The tendency to adapt the instruction to the child's capabilities and desires is increasing, and

we are endeavouring to get rid of elaboration of detail, overloading of curriculum, over-cultivation of verbal memory, and dull text-books, at least in the lower classes of our schools. All these were signs of defective method and imperfect comprehension of child nature. Suggestive hints on the teaching of little children have been thrown out by great men from Plato downward; but these, for the most part, fell upon deaf ears. Rousseau insisted that freedom and happiness belong to the period of childhood, and that the child must learn from experience and not from books. The influence of Rousseau first led Pestalozzi to simplify the elements of knowledge, and to attempt to adapt them to the child's capacities. Froebel impatiently discarded all formal studies with children of tender years, and based his early instruction on games, stories, and nature study. "Never forget," he says, "that the essential business of school is not to teach a variety and a multiplicity of things, but to give prominence to the ever-living unity that is in all things." The followers of Herbart, too, strive after unity in school studies, and they base all early instruction on the contents of the child's mind, gathered from its experience of its environment and its human relationships. This idea of unity is simple and far-reaching; yet it finds its way very slowly into our English schools.

Teachers are a conservative race—they love to plod along in the ruts made by tradition; and true educational principles may lie undisturbed in mouldering volumes for a century or so before teachers will consider or apply them.

"Some of you talk in a jargon of your own," said a teacher of ten years' standing, at a recent educational conference. "What does *correlation* mean?" Some one explained to her the idea of inner connection between school studies, and she replied, "It is too visionary, and such a scheme of studies would be fatal to the present system of examination." It is a common mistake in the school world to imagine that schools exist for the sake of examinations rather than for the sake of the child.

The following is an exact account of a recent morning's work in Standard I., in a town infant school, one bright spring day:—

Reading Lesson.—How Sponges Grow.
Recitation.—"Winter Snows."
Object Lesson.—The Camel.
Brushwork.—Painting Poppies.

The sun was shining, and a great bowl of daffodils stood on the teacher's desk; but it never seemed to occur to her that the season or outward circumstances should influence the morning's studies. The sixty little boys and girls read about sponges because this happened to be on the next page to the last lesson in their reading book. The lesson was particularly inappropriate, because the children had never seen the sea, and the subject of sponges was totally unrelated to anything in their school instruction, environment, or experience. A few pages further on was a lesson on the way seeds grow. The teacher was asked if this would not be a more appropriate reading lesson, inasmuch as it was in accord with the springtime, the season when the seeds burst into growth. She replied that it was a bad habit to allow children to skip lessons in their reading books.

The children recited "Winter Snows" because it was a part of the work planned out for the year; and, for some reason, the poem had not been learned earlier.

The lesson on the camel was given because it was one of a series on large animals. It was presented to the children in a purely formal manner, and no attempt was made to connect the lesson with any other matter in the child's experience or knowledge, or to compare or contrast the camel with any other animal. The whole matter was discussed and done with in twenty minutes. The children were told that the camel had "a hump or two humps;" that it "carried water in its pouch;" and that it had the "power of feeding on the fat of its hump." They accepted these statements indifferently. They comprehended neither the camel, nor the hump, nor the manner of feeding; but they were not interested enough to ask questions. The children painted poppies because red paint was plentiful, and the stock of other colours had run short. As the bowl of daffodils stood before the children, it was suggested to the teacher that it might be appropriate to paint them. She remarked that they had learned to paint daffodils in January.

With a very small effort this teacher could have introduced some harmony into the children's studies; but the idea never occurred to her, and suggestions were received with indifference. There were the text-books, and there was the time-table, and these were rigidly respected. That was enough.

This attitude of indifference is not entirely the fault of the teachers. Primary education was for many years subjected to a steady repression of initiation and spontaneity. Teachers were required to drudge drearily at the task of filling the children's minds with dead forms of knowledge; and now that a certain amount of freedom has come, it is difficult to recover all at once that elasticity of mind which is essential to vigorous growth and development.

The introduction of kindergarten work of recent years into our infant schools has done a great deal to brighten the teacher's work and bring joy to the children; but Froebel, like all great men with many disciples, has been grievously misunderstood, and his teachings have often been misapplied. Besides, the infant schools of the past were bound by stringent rules, and the difficulty of trying to graft a fresh vital system upon an old mechanical one led to many errors.

The idea of unity or inner connection between school studies is by no means new. All rare souls—heaven-born teachers—grasped the idea intuitively, and many lesser ones have groped after and found it. More than two centuries ago, Comenius, who was perpetually haunted by the idea of "the connection of knowledge," writes: "We see that the branches of a tree cannot live unless they all alike suck their juices from a common trunk with common roots; and can we hope that the branches of wisdom can be torn asunder with safety to their life—that is, to truth?"

Good old John Bunyan once wrote a natural history in rhyme for boys and girls. It is a quaint production, and we may perhaps be pardoned if we prefer his prose to his poetry. In this work the animals are somewhat unfairly treated in being used only to point appropriate morals. We have a fuller sense of the beauty of nature now than our forefathers had in those old Puritan days, and we are not afraid to teach our children to wonder at and admire all God's creatures. Bunyan's quaint work is called *Divine Emblems; or, Temporal Things Spiritualised.* Convinced that spiritual truth is the one thing needful, he makes it the centre of all his teaching; in the matter of connectedness he shows himself a true teacher. He treats of the frog as follows:—

"The frog by nature is both damp and cold,
Her mouth is large, her belly much will hold;
She sits somewhat ascending; loves to be
Croaking in gardens, tho' unpleasantly."

Comparison :—

"The hypocrite is like unto this frog,
As like as is the puppy to the dog;
He is of nature cold, his mouth is wide
To prate, and at true goodness to deride.
He mounts his head, as if he was above
The world, when yet 'tis that which has his love;
And though he seeks in churches for to croak,
He neither loveth Jesus nor His yoke."

This is accompanied by a delightfully quaint outline illustration of the frog holding her head in the air, which the little Puritan girls and boys must have loved to copy as they conned the rather libellous lines connecting the poor frog with the awful picture of the hypocrite.

Dear John Bunyan! he grasped many educational truths. He knew the value of allegory and comparison as well as that of correlation, and though not consciously writing for children in his *Pilgrim's Progress*, he did more for them in producing this work than any other writer, except, perhaps, Defoe.

William Jones of Nayland (1726–1800), whom Southey calls "that wise and good man," published in 1792 an attractive little book which ran through many editions. It is called *The Book of Nature; or, The True Sense of Things Explained and Made Easy to the Capacities of Children.* He believes that the language of the Scriptures forms the true concentrating core of a child's instruction.

In a series of lectures on the "Figurative Language of Scripture" he says: "So plain is this sort of teaching, and so effectual, that if I were to begin with the first elements of instruction to a child, I would teach this ideal language in preference to all the languages in the world, for this is the life and soul of all the rest."

The good man writes a series of lessons on "The Beasts," "The Eel and the Lark," "The Fading Flower," "The Bee," etc., and his object is to group his instruction around texts of Scripture. He treats the animals somewhat inadequately; but as his aim is to subordinate natural history to moral instruction, this may perhaps be pardoned.

He begins :—

"The ass hath very long ears, and yet he hath no sense of music, but brayeth with a frightful noise. He is obstinate and unruly, and will go his own way, even though he is severely beaten. The child who will not be taught is but little better; he hath no delight in learning, but talketh of his own folly, and disturbeth others with his noise."

He goes on to discourse in like manner of the dog, the fox, the wolf, and the adder. His texts are chosen because of their accidental allusions to various animals, and are to be learned by heart without any explanation apparently.

"A bridle for the ass, and a rod for the fool's back" (Prov. xxvi. 3).

"Go, tell that fox" (Luke xiii. 32).

"Many dogs have compassed me about" (Ps. xxii. 16).

"That old serpent, called the Devil, and Satan" (Rev. xii. 9).

"Ye shall have in abomination among the fowls the owl and the bat" (Lev. xi. 13).

His questions are very quaint and strenuous :—

Q.—What is the child who will not learn?

A.—An ass, which is ignorant and unruly.

Q.—What are wicked men, who hurt and cheat others?

A.—They are wolves and foxes and bloodthirsty lions.

Q.—What are liars?

A.—They are snakes and vipers, with double tongues, and poison under their lips.

Q.—For what end did God make the lark and the dove?

A.—To teach us what we ought to be.

Q.—Why did He make owls, bats, and swine?

A.—To teach us what we ought not to be.

In spite of its fearful warnings, this book is interesting. The writer's insight led him to use concrete examples, and to group his teaching around one central idea, and we can imagine small boys and girls being fascinated and awed by the strength and severity of his conclusions.

From Bunyan and William Jones to Froebel is a far cry. Froebel's treatment of nature is wholly unlike that which grew up under the Puritanical influence. Bunyan and his imitators wished the child to hate evil, by discovering fancied resemblances to it in God's creatures. Froebel believed that a sympathetic study of nature exerts a strong moral influence upon the child; so he takes him to nature, and through its wonders reveals the greatness and goodness of the Creator. He would have us fix the child's attention on the beauty, order, and mystery of nature, rather than on its ugliness and abnormality. He would have mothers and teachers take the natural objects lying around the child—the lily of the valley, the mouse, the butterfly, the bird's nest, the snowflake, the seed in spring, the fruit in autumn—and show through these the love and care of the Almighty. He wished to lead the child to love God by a loving study of His works. Froebel saw with great clearness of vision the unity between God, nature, and man; and he taught that nature was the best revealer of God to the child. He is very clear on the necessity of establishing relationships among school studies for the sake of promoting unity and harmony in the minds of the children. Therefore the school studies are arranged around a central point, which the season of the year or some interesting local event suggests.

The following is a scheme of lessons for the month of June, arranged and given by students of Froebel.

The nature studies are the predominating feature, and the season of the year suggests them.

CENTRAL IDEA: PEAS AND BEANS. MONTH: JUNE.

Object Lessons:—

1. The pea flower.
2. The bean flower.
3. Comparison of pea and bean flower.
4. Other "butterfly" flowers examined.
5. The development of the pod.
6. Examination of ripe pods.
7. Pea and bean plants compared.
8. Shelling and cooking peas.

Drawing Lessons:—

1. Pea leaf.
2. Bean leaf.
3. Pea pod.
4. Bean pod.
5. Watering-can to water peas.
6. Dish to contain the peas.

Colouring Lessons:—

1. Pea flower painted.
2. Bean flower painted.
3. Open pea pod.
4. Open bean pod.
5. Design of pea flowers.

Modelling:—

1. Leaf of pea plant.
2. Pea pod.
3. Dish to contain peas.
4. Watering-can.

Song:—"The Little Gardener."

Stories:—
1. "Jack and the Bean Stalk." | 2. "Little Pea Blossom."

Arithmetic:—
Easy problems in addition and subtraction, using peas as concrete objects.

Finger-work:—
Fences, chairs, and tables made of softened peas and laths.

Froebel is supposed to believe that a proper study of nature lays the true foundation of character in the child, and that literature and history are of value chiefly as supplementary aids to nature study in training the child's character.

Froebel planned a definite scheme for the education of humanity through the four periods of infancy, childhood, youth, and manhood; but he did not live to work out the details of his system beyond the first period—the kindergarten stage.

He insists on *sequence* in studies as well as *connectedness*. He considers the work of each school year as an organic whole, and the work of each day, week, and month must be logically related to that whole; while the work of every school year ought to accomplish a definite work in the child's development, and lead on naturally to the next year's work.

Froebel's idea of "connectedness," and, to a lesser extent, his idea of sequence of studies, have been applied in many of our kindergartens and primary infant schools with good results. Much, however, remains to be done. With regard to schools for older scholars, the haphazard method of crowding the curriculum with unrelated subjects still prevails. Children are expected to acquire a certain amount of knowledge, and attain to a certain degree of skill, to meet the needs of conventional examinations; hence the true aim of education—the harmonious development of the human being, body and soul—is frequently overlooked.

The followers of Herbart attach considerable importance to what they call "concentration of school studies." This is one of their chief articles of educational faith. They point out that school studies are, from their very nature, closely related; that literature has many connections with history; history with geography; geography with science; science with arithmetic, geometry, and so on; also that drawing, painting, and various forms of hand work may be associated usefully with the various school subjects. Judicious selection of essentials is the principle of a concentrated scheme of studies. It is urged that the concentration of school studies increases the child's interest, ensures thoroughness of work, and aids in developing a logical memory. A carefully-concentrated scheme of studies also lightens the pressure thrown upon the time-table, by getting rid of much irrelevant matter imposed by the text-books.

Above all, Herbartians insist that the concentration of studies tends to strengthen character, because strong and consistent conduct depends upon the unity of ideas existing in the mind. Hence they endeavour, as Froebel did in his kindergarten, to make the school curriculum an organic whole. They believe that the child passes through various stages of culture in his growth from infancy to youth, and that the school studies of each year should be logically connected, in order to aid his development. Their problem is not easy. They select for each school year the material which they consider accords with the child's stage of development, they connect all the subjects into an organic whole, and they arrange that the logical sequence of each school subject should be carried on from year to year. It will be readily seen that the selection of an adequate central subject—"core of concentration"—which shall dominate the whole scheme of studies is a matter of profound importance.

In all discussions on the correlation of school subjects the question of the central subject has been a weighty problem. In choosing this we ought to be guided by various considerations:—

First, the ethical worth of the subject.

Second, the number and closeness of its relations with other subjects.

Third, the necessary sequence.

Froebel is credited with having made nature study his central subject. He is convinced that the ethical value of this subject is great, and for young children, at any rate, there are plenty of relations with geography, history, literature, and other subjects. We certainly cannot be followers of Froebel unless we accept the study of nature as one of the essential articles of our educational creed, and much of the kindergarten work in our primary schools lacks vitality, owing chiefly to our very imperfect conception of the study of nature. The Americans have done more in this matter of recent years, hence their success in teaching little children.

Nature study, however, it has been urged, has no necessary sequence. One is guided in selecting subjects chiefly, in the early stages, by the child's environment and the seasons of the year; but the choice is arbitrary, and the topics are loosely related. The squirrel, the horse-chestnut, the plum, and the mole are of equal importance to the country child, who is familiar with these things, just as the crab, or the sea-gull, or the starfish may be equally well studied by children at the seaside. When geology, botany, or zoology is systematically studied in later years, a necessary sequence is followed; but in the early studies this sequence is lacking.

Some of Froebel's followers contend that he did not make any one subject the connecting centre. Others affirm that he made the child himself and his needs the true core of connection; this, of course, would necessitate a separate scheme of studies for each individual. Others, again, say that he considered mathematics to be the true centre. This last may be true; for inasmuch as he worked out with beautiful precision concrete problems of geometry with the young child, and as geology, physics, chemistry, and kindred subjects are intimately connected with mathematics, he may have had in his mind a scheme for unfolding the subject in its many connections throughout the later periods of education, which he never worked out in detail.

In Switzerland and in America, geography is sometimes looked upon as a convenient connecting centre. Karl Ritter, the founder of the *science* of geography, who visited Pestalozzi at Yverdon, was struck by the possibilities of geography as an *associative science*. He wrote after his visit: "There is between nature study and history a great gap to be filled up, and I am firmly resolved to fulfil the promise I made to Pestalozzi to apply his method to geography." Ritter, in his great work on the subject, shows the relations of geography to nature and to the history of man. This work has inspired much of the best geography teaching since his day, and enthusiasts urge that the subject is capable of appealing to the imagination, of affording moral discipline, and arousing interest, equally with history.

It is urged against geography, however, that it lacks ethical content and logical unfolding in definite sequence; for geography has no long series of closely-connected thoughts which may be gradually unrolled year by year throughout the school course. But it is certainly true that geography has a large number of relations with other school subjects.

Suggestions have come from manual-training enthusiasts urging that modelling, drawing, or painting should be the leading features of the school curriculum. For young children some pretty schemes might be worked out; but much as we may value hand and eye training, no one would seriously wish to make it the dominant note throughout the entire school course.

The Humanistic Centre.—The Herbartians make history and literature the leading note in school instruction. Humanistic studies, they affirm, have a necessary ethical content, and a series of close relations with other school subjects, as well as a necessary sequence. The events in the humanistic studies are linked chronologically, and the sequence could not be greatly varied.

History and literature are also closely associated with language, and the importance of the study of the mother tongue for younger children cannot be too strongly emphasised.

In the lower classes of the school the Herbartians give the place of honour to the study of the mother tongue, and the history and literature of the mother country, and these give way to the study of other languages and literature and general history in upper classes. That the staple of every child's education should be the language and literature of his mother tongue, is one of the fundamental principles constantly emphasised by Luther, Pestalozzi, and others, who have considered the education of children a matter of profound importance to the State.

The Herbartians hold that literature and history educate the religious sentiment, develop individual and social sympathies, and train the judgment and the moral and æsthetic senses. These studies also educate the heart, and foster a feeling of kinship with humanity; therefore they claim the first place in the curriculum.

Striking periods are chosen from the world's history suited to the child's stage of development, and the other school studies—geography, arithmetic, science, drawing, etc.—are grouped around and associated with these historical periods. It cannot be too strongly urged that children must have systematic instruction in school; and if education means anything, it means a coherent arrangement of ideas in the child's mind, so that he may see the world as a harmonious whole rather than as a few groups of disconnected incidents.

HOW TO PREPARE AND PRESENT THE LESSONS.

The so-called object lessons of the old type which young children are called upon to endure at the hands of young teachers are, as we have seen, often mere masses of information gleaned from the pages of encyclopædias, and arranged according to a stereotyped plan which is thought to be logical. A sheet of paper ruled into three columns, and inscribed with the time-honoured words HEADS, MATTER, METHOD, and an encyclopædia, seem to furnish the young teacher with materials for preparing any lesson under the sun.

"It is not at all essential that school children should know much of anything, but it is essential that they know thoroughly, according to a sound method, what they profess to know." * Yet teachers go on striving to teach much, and despise sound methods.

We all know the bald, bookish lessons which young teachers produce after a study of the encyclopædia, rather than a study of what the child already knows. They undervalue the use of experience, and they love to get facts out of books, which they slavishly repeat to their class. They are too timid to see things with their own eyes, and to describe what they see. I once asked three very young students to prepare a simple lesson on the daisy. Two of them failed to do it, and told me at the end of a week that there was nothing about daisies in the object-lesson books they had consulted; and the third had prepared a lesson on the nutmeg instead, because, as she expressed it, she had "found the *matter* in a book."

I remember the lesson still, with its uninteresting detail, technical terms, absence of associating links with other lessons, feeble questions, poor attempts at comparison, and amazing mass of words. There was plenty of information in this lesson, of a sort; but the child wants at this stage *simple*, *clear*, *firm* perceptions of objects rather than masses of information about them.

The objects must be presented to the child; he must examine and handle them, in order to learn for himself "the qualities they put forth." And after forming his own ideas about them, he must learn to express these ideas in his own language. Distinct names should be given to the object and its parts—a local, homely name if possible. All difficult technical terms should be avoided. A descriptive name is best: for instance, calyx may be described as a *flower cup* or *coat*, and the form of the daffodil leaves may be called *sword-shaped*.

Herbart lays down very definite instructions for helping the teacher to gain the "primitive attention" of young children. He insists on the need of "direct sense perception of things." Failing the object itself, a good picture is to be preferred to a verbal description, as it gives a stronger impression. The teacher who can sketch rapidly and well on the blackboard is never helpless before a class. She can express her thoughts to the children even if she has not pictures, models, or specimens. Elaborate finished sketches are not so effective as a rapid sketch drawn before the class.

Herbart next demands "clearness in single perceptions." Each point must be presented separately and clearly, and carefully studied. A hasty piling up of one fact upon another is to be avoided. Every point in the lesson must lead on to the next in an orderly manner. There must be frequent resting-places in the lesson, so that the child may take in the facts presented to him, and apprehend them in their proper connection. Frequent pauses are made in the lessons which follow, for the children to think over what they have learned, and to express it in their own language.

Herbart further insists that everything must be connected. One part of a subject must be related to another, and the relations which exist between different subjects must be brought out. The child's attention is disturbed by the intrusion of foreign matter. Old material which the children have already learnt must be constantly called up and associated with new material. Old ideas must be frequently used to help the child to comprehend the new. Herbart insists on the frequent application of knowledge which the child possesses; but he would have teachers avoid mere repetition of familiar words. He prefers that the child's mind should

* Professor Laurie.

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He insists on *sequence* in studies as well as *connectedness*. He considers the work of each school year as an organic whole, and the work of each day, week, and month must be logically related to that whole; while the work of every school year ought to accomplish a definite work in the child's development, and lead on naturally to the next year's work.

Froebel's idea of "connectedness," and, to a lesser extent, his idea of sequence of studies, have been applied in many of our kindergartens and primary infant schools with good results. Much, however, remains to be done. With regard to schools for older scholars, the haphazard method of crowding the curriculum with unrelated subjects still prevails. Children are expected to acquire a certain amount of knowledge, and attain to a certain degree of skill, to meet the needs of conventional examinations; hence the true aim of education—the harmonious development of the human being, body and soul—is frequently overlooked.

The followers of Herbart attach considerable importance to what they call "concentration of school studies." This is one of their chief articles of educational faith. They point out that school studies are, from their very nature, closely related; that literature has many connections with history; history with geography; geography with science; science with arithmetic, geometry, and so on; also that drawing, painting, and various forms of hand work may be associated usefully with the various school subjects. Judicious selection of essentials is the principle of a concentrated scheme of studies. It is urged that the concentration of school studies increases the child's interest, ensures thoroughness of work, and aids in developing a logical memory. A carefully-concentrated scheme of studies also lightens the pressure thrown upon the time-table, by getting rid of much irrelevant matter imposed by the text-books.

Above all, Herbartians insist that the concentration of studies tends to strengthen character, because strong and consistent conduct depends upon the unity of ideas existing in the mind. Hence they endeavour, as Froebel did in his kindergarten, to make the school curriculum an organic whole. They believe that the child passes through various stages of culture in his growth from infancy to youth, and that the school studies of each year should be logically connected, in order to aid his development. Their problem is not easy. They select for each school year the material which they consider accords with the child's stage of development, they connect all the subjects into an organic whole, and they arrange that the logical sequence of each school subject should be carried on from year to year. It will be readily seen that the selection of an adequate central subject—"core of concentration"—which shall dominate the whole scheme of studies is a matter of profound importance.

In all discussions on the correlation of school subjects the question of the central subject has been a weighty problem. In choosing this we ought to be guided by various considerations:—

First, the ethical worth of the subject.

Second, the number and closeness of its relations with other subjects.

Third, the necessary sequence.

Froebel is credited with having made nature study his central subject. He is convinced that the ethical value of this subject is great, and for young children, at any rate, there are plenty of relations with geography, history, literature, and other subjects. We certainly cannot be followers of Froebel unless we accept the study of nature as one of the essential articles of our educational creed, and much of the kindergarten work in our primary schools lacks vitality, owing chiefly to our very imperfect conception of the study of nature. The Americans have done more in this matter of recent years, hence their success in teaching little children.

Nature study, however, it has been urged, has no necessary sequence. One is guided in selecting subjects chiefly, in the early stages, by the child's environment and the seasons of the year; but the choice is arbitrary, and the topics are loosely related. The squirrel, the horse-chestnut, the plum, and the mole are of equal importance to the country child, who is familiar with these things, just as the crab, or the sea-gull, or the starfish may be equally well studied by children at the seaside. When geology, botany, or zoology is systematically studied in later years, a necessary sequence is followed; but in the early studies this sequence is lacking.

Some of Froebel's followers contend that he did not make any one subject the connecting centre. Others affirm that he made the child himself and his needs the true core of connection; this, of course, would necessitate a separate scheme of studies for each individual. Others, again, say that he considered mathematics to be the true centre. This last may be true; for inasmuch as he worked out with beautiful precision concrete problems of geometry with the young child, and as geology, physics, chemistry, and kindred subjects are intimately connected with mathematics, he may have had in his mind a scheme for unfolding the subject in its many connections throughout the later periods of education, which he never worked out in detail.

In Switzerland and in America, geography is sometimes looked upon as a convenient connecting centre. Karl Ritter, the founder of the *science* of geography, who visited Pestalozzi at Yverdon, was struck by the possibilities of geography as an *associative science*. He wrote after his visit: "There is between nature study and history a great gap to be filled up, and I am firmly resolved to fulfil the promise I made to Pestalozzi to apply his method to geography." Ritter, in his great work on the subject, shows the relations of geography to nature and to the history of man. This work has inspired much of the best geography teaching since his day, and enthusiasts urge that the subject is capable of appealing to the imagination, of affording moral discipline, and arousing interest, equally with history.

It is urged against geography, however, that it lacks ethical content and logical unfolding in definite sequence; for geography has no long series of closely-connected thoughts which may be gradually unrolled year by year throughout the school course. But it is certainly true that geography has a large number of relations with other school subjects.

Suggestions have come from manual-training enthusiasts urging that modelling, drawing, or painting should be the leading features of the school curriculum. For young children some pretty schemes might be worked out; but much as we may value hand and eye training, no one would seriously wish to make it the dominant note throughout the entire school course.

The Humanistic Centre.—The Herbartians make history and literature the leading note in school instruction. Humanistic studies, they affirm, have a necessary ethical content, and a series of close relations with other school subjects, as well as a necessary sequence. The events in the humanistic studies are linked chronologically, and the sequence could not be greatly varied.

History and literature are also closely associated with language, and the importance of the study of the mother tongue for younger children cannot be too strongly emphasised.

In the lower classes of the school the Herbartians give the place of honour to the study of the mother tongue, and the history and literature of the mother country, and these give way to the study of other languages and literature and general history in upper classes. That the staple of every child's education should be the language and literature of his mother tongue, is one of the fundamental principles constantly emphasised by Luther, Pestalozzi, and others, who have considered the education of children a matter of profound importance to the State.

The Herbartians hold that literature and history educate the religious sentiment, develop individual and social sympathies, and train the judgment and the moral and æsthetic senses. These studies also educate the heart, and foster a feeling of kinship with humanity; therefore they claim the first place in the curriculum.

Striking periods are chosen from the world's history suited to the child's stage of development, and the other school studies—geography, arithmetic, science, drawing, etc.—are grouped around and associated with these historical periods. It cannot be too strongly urged that children must have systematic instruction in school; and if education means anything, it means a coherent arrangement of ideas in the child's mind, so that he may see the world as a harmonious whole rather than as a few groups of disconnected incidents.

HOW TO PREPARE AND PRESENT THE LESSONS.

The so-called object lessons of the old type which young children are called upon to endure at the hands of young teachers are, as we have seen, often mere masses of information gleaned from the pages of encyclopædias, and arranged according to a stereotyped plan which is thought to be logical. A sheet of paper ruled into three columns, and inscribed with the time-honoured words HEADS, MATTER, METHOD, and an encyclopædia, seem to furnish the young teacher with materials for preparing any lesson under the sun.

"It is not at all essential that school children should know much of anything, but it is essential that they know thoroughly, according to a sound method, what they profess to know." * Yet teachers go on striving to teach much, and despise sound methods.

We all know the bald, bookish lessons which young teachers produce after a study of the encyclopædia, rather than a study of what the child already knows. They undervalue the use of experience, and they love to get facts out of books, which they slavishly repeat to their class. They are too timid to see things with their own eyes, and to describe what they see. I once asked three very young students to prepare a simple lesson on the daisy. Two of them failed to do it, and told me at the end of a week that there was nothing about daisies in the object-lesson books they had consulted; and the third had prepared a lesson on the nutmeg instead, because, as she expressed it, she had "found the *matter* in a book."

I remember the lesson still, with its uninteresting detail, technical terms, absence of associating links with other lessons, feeble questions, poor attempts at comparison, and amazing mass of words. There was plenty of information in this lesson, of a sort; but the child wants at this stage *simple, clear, firm* perceptions of objects rather than masses of information about them.

The objects must be presented to the child; he must examine and handle them, in order to learn for himself "the qualities they put forth." And after forming his own ideas about them, he must learn to express these ideas in his own language. Distinct names should be given to the object and its parts—a local, homely name if possible. All difficult technical terms should be avoided. A descriptive name is best: for instance, calyx may be described as a *flower cup* or *coat*, and the form of the daffodil leaves may be called *sword-shaped*.

Herbart lays down very definite instructions for helping the teacher to gain the "primitive attention" of young children. He insists on the need of "direct sense perception of things." Failing the object itself, a good picture is to be preferred to a verbal description, as it gives a stronger impression. The teacher who can sketch rapidly and well on the blackboard is never helpless before a class. She can express her thoughts to the children even if she has not pictures, models, or specimens. Elaborate finished sketches are not so effective as a rapid sketch drawn before the class.

Herbart next demands "clearness in single perceptions." Each point must be presented separately and clearly, and carefully studied. A hasty piling up of one fact upon another is to be avoided. Every point in the lesson must lead on to the next in an orderly manner. There must be frequent resting-places in the lesson, so that the child may take in the facts presented to him, and apprehend them in their proper connection. Frequent pauses are made in the lessons which follow, for the children to think over what they have learned, and to express it in their own language.

Herbart further insists that everything must be connected. One part of a subject must be related to another, and the relations which exist between different subjects must be brought out. The child's attention is disturbed by the intrusion of foreign matter. Old material which the children have already learnt must be constantly called up and associated with new material. Old ideas must be frequently used to help the child to comprehend the new. Herbart insists on the frequent application of knowledge which the child possesses; but he would have teachers avoid mere repetition of familiar words. He prefers that the child's mind should

* Professor Laurie.

be exercised by constant application. Oral reproductions, drawing, writing, bodily movements, are all exercises which help to impress the memory, and may be used in the application of knowledge. Herbart also insists that the instruction is to be built up on the foundations of experience which the child has gained in and out of school; hence the home and school life should be in continual reciprocity.

Childhood is the time to gather data, and to get to know single things clearly and thoroughly by means of the senses. "To exercise the senses carefully in discriminating the differences of natural objects is to lay the foundation of all wisdom, all eloquence, and all prudent action," said Comenius. Facts, words, definitions, and rules simply stored in the memory are of little use to the child. Facts, before they can be said to form a part of the mental furniture of the owner, must pass through various processes. They must be sifted, sorted, classified, and connected. These processes require more labour, time, and thought than mere acquisition; but only when the facts are worked over in this way is knowledge really assimilated.

The true method of imparting knowledge is to proceed from "particulars to the general, and back again to particulars." The child is set to study individual cases, to compare them, to group them, and finally to arrive at a general conclusion or law concerning them. This law he is required to apply to other cases. For instance, the child, after a series of studies on hens' eggs, frogs' eggs, chickens, and tadpoles, arrives at the following general conclusion: "Tadpoles and chickens come from eggs, and they are hatched by warmth." This statement can be further emphasised in studying the life of the swan, the duck, the butterfly, the ant, and other living creatures. Again, after studying the snowdrop, the daffodil, and the lily of the valley, and comparing and contrasting them with the violet, the primrose, and the cowslip, and after observing the germination of the wheat and the bean in various stages, the children are led to make the following generalisation: "Some plants are like the wheat, in having long, narrow, straight-veined leaves, and flowers whose parts are grouped in threes. Some are like the bean, in having leaves with midribs, branched veins, and flowers whose parts are grouped in fives."

In further study of plant life the children apply this law to other cases, and learn to group into the two great divisions.

This is surely a more rational method than beginning the study of plant life with the statement, "There are two great classes of plants—the monocotyledons and the dicotyledons," as teachers of even quite young children are frequently guilty of doing. It is also more satisfactory than giving occasional lessons on such subjects as trees, the cotton-plant, insects, the nutmeg, the india-rubber tree, etc., which were so common in many of our infant schools and lower classes.

The Herbartians expand this principle of "from particulars to the general" into the theory of the "five formal steps." They begin by presenting single particular concrete cases; they compare with other cases; they arrive at a general truth, formulate it, and finally apply it.

The material for school instruction is carefully chosen for the school year. This material forms an "organic whole," of which every part helps to complete and illustrate other parts. The whole is divided for convenience into groups sufficient for a school term. This manual contains material for the spring term—from February to the beginning of May. Each of the school subjects is further mapped out into convenient sections called "method wholes," and each method whole contains a clear general truth. It is the aim of the teacher to lead the children to arrive at these general truths for themselves.

The five stages in each method whole follow the classification of Professor Rein, and are adopted in many of the Herbartian schools in Germany. The five steps are:—

1. Preparation.
2. Presentation.
3. Association.
4. Formulation.
5. Application.

1. **Aim and Preparation.**—The first step, preparation, includes the statement of the aim, by means of which the child learns clearly what he is going to do. There is no need to make a mystery of the subject of the lesson. "What does your mother sometimes put in rice puddings?" asked a young teacher of her class. "Eggs," "Milk," "Sugar," "Water," "Currants," were answers that the children very naturally gave. "Yes, yes," she replied in irritation; "but I don't want those answers." She wished the children to say "nutmeg;" but as none of them guessed the right answer, she said they were dull, and her temper suffered at the outset as she began to pour upon the children streams of uninteresting detail about nutmegs. In the lesson on the life of a bean plant, the teacher began by making a simple statement: "We shall see how the bean is like a frog's egg." This was said slowly and impressively; it aroused the child's expectation at once in the subject, and helped to drive out of his mind alien ideas, and call up ideas he had on beans and frogs' eggs.

"What are we going to do?" asked the teacher presently; and individual children were required to state the aim of the lesson.

The statement of the aim must be simple; it should contain no indefinite or unknown words, it should have a concrete content, and it should never be merely formal.

The aim leads on immediately to the preparation. "What can you tell me about beans?" was the next question. Children whose spontaneity and curiosity have not been checked in school will contribute various ideas on the matter. "They have red flowers." "They grow in shells like peas, only bigger." "We eat them with bacon." "They are for feeding horses." All these remarks, and others, were made in an actual lesson on the bean plant. The teacher waited until the ideas of the class were exhausted. Then she discussed the children's statements, arranged the various ideas, rejecting what was false; then she summed up the whole. For instance, from the above remarks she may require a connected account, something like this: "Beans are of various kinds; some bean plants have red flowers. Beans grow in shells like peas. Some kinds of beans are used for our food, and some for feeding horses."

In the early stages of instruction children have few ideas, and these are chiefly derived from original sources; hence the preparation is often meagre but vivid. In later school years, when the child has had wider experience and knowledge, he is frequently able to contribute many interesting details to this stage of the lesson. The preparation paves the way for the acquisition of new material, by calling up the old ideas connected with the subject which already exist in the child's mind.

"To instruct," says Professor Laurie, "we must always build the new upon the old, on what is known. And again, "Link the teaching of the new with facts already known with which the new has a real relation of likeness or unlikeness, so that the growth of knowledge may be an organic growth."

The first step, then, *preparation*, calls into consciousness ideas related to the subject in hand. It consists in going over the pupil's stock of knowledge and setting it in order, so to speak, that the reception of the new matter may take place easily and naturally. Preparation is chiefly analytical; the following stage, *presentation*, is synthetical.

2. **Presentation.**—This step consists in laying the new matter before the pupil. In a lesson on the bean we put the object before him, and direct him how to examine it. The observations in Step II. of the bean study required three lessons. The following observations were made:—

(*a*) Examination of ordinary dried broad beans.

(*b*) Examination of beans that have been soaked for twenty-four hours in water.

(*c*) Examination of beans that have been planted for three days.

(*d*) Examination of beans that have been planted for a fortnight.

At the end of each examination the children's observations were collected and expressed in correct language. Orderly repetition and good expression are necessary items in the child's development. At the conclusion of the third lesson—for a presentation may often be continued into several lessons—a connected reproduction of the whole was required from the children before proceeding to the next step.

"One thing at a time" is the ruling principle of this part of the lesson. A single point is presented to the child, his entire energy concentrated upon it until it is slowly and thoroughly mastered; a sufficient time is allowed for reflection upon it, and then his observations are summed up and stated in exact words before proceeding to the next point. Not quantity but thoroughness is demanded.

Intelligent thought requires time; therefore it is a great mistake to encourage a quick succession of rapid answers from the pupils, and to praise their readiness in the answers. This leads to mechanical memory and lack of thought; and this over-cultivation of verbal memory, at the expense of intelligent thought and accurate observation, is one of the greatest evils of our schools.

3. **Association.**—At the end of the presentation the child may be said to have obtained a complete mastery of single things. This clear comprehension of single things and externals is a very necessary part of teaching; but the teacher's task is only half completed when the child is put in possession of the new knowledge. The illiterate mind is content with single details; it does not rise to general ideas and relationships. The child must be put on the way to find the laws and causes which govern groups of details, and the third step, *association*, is of importance in helping him to do this. A parallel is set up between new matter and the old, by means of which the child is finally brought to the general truth contained in the concrete material. The object of comparison must not be chosen haphazard, without plan; it must be well known to the child in all its details. In this case we draw a parallel between the present study (the life of the bean plant) and a past study (the life of the tadpole). The association in this instance required a whole lesson.

The following points were brought out for comparison:—The bean contains the baby plant and its food; the frog's egg contains the baby tadpole and its food. The bean is protected by a tough skin; the egg is protected by jelly. The bean requires warmth and moisture to make the baby plant grow; the egg requires warmth to hatch it. The bean grows slowly, and sends forth two tiny leaves and a root; the tadpole grows slowly. The bean becomes a bean plant, and the egg becomes a baby frog. This step leads on naturally to the formulation of the general law or fact, which is expressed in exact language.

4. **Generalisation.**—In this case the children readily learnt the formulation: "The bean seed and frog's egg are alike in containing either a baby plant or a baby tadpole, and food to feed them. They both require warmth, and they both grow slowly." The essential general idea gained from this series of lessons is that in the origin and development of animal and plant life there are many points in common. This general idea is capable of application throughout the whole of the future nature studies of the child.

Herbart especially warns teachers that they cannot always, with young children, lead on to generalisations. Children's experiences are not sufficiently numerous in every instance to form the basis of generalisation. Therefore we must frequently be content, in the child's early school years, with complete summaries instead of hasty generalisations.

5. **Application.**—In this stage we require the pupil to apply the knowledge already learnt, and seek to deepen the impression made by requiring him to express his ideas either in language, brush-work, drawing, modelling, learning by heart, writing verbal descriptions, experiment, working out problems, or in learning to sing songs which bear on the point. A good deal of the manual work will come under the head of Application.

The formal studies—reading, writing, and arithmetic—may be made largely incidental to the *thought* studies which are worked out in Parts II. and III.

Suggestions are made under the head of Application to show how exercises in the formal part of school instruction may creep in unawares, just when the child's interest is fully aroused.

Definite lessons must, of course, be given in reading, writing, and arithmetic; but these, being more or less mechanical, should not occupy the larger part of the school time. Make the school studies full, rich, and interesting, and the children will master the dry details without weariness.

A FAIRY TALE WORKED OUT.

Analysis of "The Pea Blossom."

HANS ANDERSEN.

Central Idea: Value of Humble Work.

STEP I. PREPARATION.—Analysis of Children's Ideas.

STEP II. PRESENTATION.—
- (*a*) Five Peas at Home.
- (*b*) The Peas start on their Travels.
- (*c*) How the Travels ended.
- (*d*) The Journey of the Fifth Pea.
- (*e*) The Work of the Fifth Pea.

STEP III. ASSOCIATION.—Comparison of the character, aims, and destiny of the five peas.

STEP IV. FORMULATION.—"Content to fill a little space,
If God be glorified."

STEP V. APPLICATION.—Repeating Poems; Story of Theocrite; Picture Arithmetic; Drawing, Painting, etc.

STEP I.—PREPARATION.

Aim.—We are going to hear the story of five peas, and to learn what use they were of in the world.

Questions.—What are peas? Where do we find them? Of what colour are they? How many are there in a pod? What do we do with peas? ("Eat them," "Plant them," "Put them into soup," "Shoot them out of a pea-shooter." *) What time do we plant peas? When do we gather them? What are the peas like when they are ripe? What kind of flowers grow on the pea plant? When do the flowers bloom?

Recapitulate chief points, and require connected narrative from individual children.

STEP II.—PRESENTATION.

(*a*) **Five Peas at Home.**—Once there were five peas in one pod. They were green, and the shell was green, and they thought that the whole world was green. The pod grew, and the peas grew, and sat all in a row. The sun shone without, and warmed the shell, and the rain made it clear; and the peas sat there growing bigger and bigger, and they wondered what work there was for them to do in the world. "Are we to sit here for ever?" asked one. "We shall become hard with so much sitting. It seems to me there must be something outside."

The weeks passed on, and the peas became yellow and the shell became yellow. "All the world is turning yellow," they said; and perhaps they were right. Suddenly they felt a pull at the shell: it was torn off and slipped into a jacket pocket in company with other pods. "Now we are going to be opened," said one. "I wonder which of us will travel farthest," said the smallest pea. "What will happen will happen," said the largest pea.

Questions.—Of what colour were the peas and the shell? What colour did the peas think the world was? What made the peas grow? How did they sit as they were growing? What did they think about? Why did they think they would get hard? Are hard peas good to eat? Do we plant soft peas or hard peas? Why did the peas begin to get yellow? What colour did they think the world was now? What happened to them presently? Who do you think pulled the pod? Where did he put it? Why did he want it? Were the peas glad that they were going to travel? [Blackboard sketch of a pea-pod closed; also of a pea-pod open, showing the five peas. These should be rapidly sketched as the teacher talks.]

Recapitulation, in children's own words.

(*b*) **The Five Peas start on their Travels.**—Crack went the shell as it burst, and the five peas rolled out into the bright sunshine. They lay in a child's hand, and he said they were fine peas for his pea-shooter.

The boy put one into his pea-shooter and shot it out. "Now I am flying into the wide world," he said. "Catch me if you can," and he was gone.

"I mean to fly straight into the sun," said the next pea, and away he went.

The next two peas were lazy. They said, "We will go to sleep whatever happens, but we shall go farther than the others."

"What will happen will happen," said the last and the largest pea, as he was shot out of the pea-shooter.

Questions.—What did the boy do with the pea-pod? What did he say about the peas? What is a pea-shooter? [Teacher may make one, or draw it on the blackboard.] What did the first pea say? Where did the second pea say he was going? What do you know of the two next peas? What did the last pea say? [Blackboard sketch of the five peas. Teacher draws with green chalk.]

RECAPITULATION.—Require children to tell the story of how the five peas started on their travels.

(*c*) **How the Travels ended.**

First Pea.—The first pea, who said, "Catch me if you can," fell into a gutter on the roof of a house, and a pigeon flew by and spied him, and ate him.

Second Pea.—The second, who meant to fly to the sun, fell into the sink, and there he lay in the dirty water for days and weeks, and he swelled and swelled until he was a great size. "I am getting beautifully fat," he said. "I expect I shall burst at last, and no pea could do more than that, I think. I am the most remarkable of the five peas," and he puffed with pride.

Third and Fourth Peas.—The lazy peas were also carried up to a roof, and were eaten by pigeons; so they were at least of some use in the world, while the proud pea in the sink was not.

Questions.—What became of the first pea? What is a roof? and a gutter? What is the use of a gutter? What are pigeons? Was the first pea of any use? What became of the second pea? (He was a boastful, proud pea, and he came to a bad end.) Was he of any use in the world? Did he think he was of any use? What do you know of the third and fourth peas? Why do you think they were lazy? [Blackboard sketch of roof and pigeon.]

(*d*) **The Journey of the Fifth Pea.**—The fifth pea was the big one. He flew up against an old board under a garret window, and fell into a tiny crack which was filled up with moss. He lay there still and unnoticed; but God saw him. In the garret lived a poor woman, who went out to work every day. Her daughter was weak and ill, and she had lain in bed for a whole year. "She will die like her little sister," thought the poor mother. And the sick girl lay patiently in bed all day, while her mother was away working.

Questions.—Where did the fifth pea go? What did he say as he started? What is a garret? Where did the pea fall? What would be likely to be in a tiny crack? (Earth and moss.) Could the pea grow in earth and moss? Did any one see the pea as it lay in the crack? Who lived in the garret? What do you know about the poor woman and her daughter?

Recapitulation.

(*e*) **The Work of the Fifth Pea.**—Spring came at last, and the sick girl said one day, "Mother, what is that little green thing that peeps in at the window and moves in the wind?"

"It is really a little pea that has taken root in the crack," said her mother. "Well, now, there is a little garden to amuse you." And the mother moved the sick girl's bed nearer to the window.

The sun shone brightly, and the little pea throve, and the sick girl said in the evening, "Mother, I think I shall get well."

The mother tied a piece of string for the little pea plant to climb up, and she hoped that her child might really recover. At last a pea blossom bloomed on the little plant, and the sick girl sat up by the open window in the warm sunshine, watching the pink pea blossom in full bloom. "God Himself has planted that pea to bring joy to you and hope to me," said the mother;

* All these answers were received from children of six.

and she smiled at the flower as if it had been an angel from God.

When summer came the sick girl grew strong and well; so the little pea plant had not lived in vain.

Questions.—What did the sick girl see through the window when spring came? What was the tiny green thing? How had it come there? How had it grown? (The warmth of the sun and the moisture of the rain had fed it.) [Show pea shoots growing in pots which have been used for the germination lessons.] What kind of blossom came on the pea plant? What did the pea plant do for the sick girl? (It brought her joy and hope, and it made her well.) What did the mother say?

Recapitulation of the whole. Children are required to narrate the story in their own words.

Step III.—Association.

Compare the character, aims, and destiny of the five peas. (An association may be made with the story of "The Snowdrop" if the teacher chooses.)

First Pea.	Second Pea.	Third and Fourth Peas.	Fifth Pea.
Discontented and restless. Wanted to go into the wide world.	Boastful and proud. Wanted to fly to the sun.	Lazy, careless, and boastful. Wanted to go farther than the others.	Contented and humble. Wanted to find what work there was for him.
Fell into a gutter.	Fell into the sink.	Eaten by pigeons.	Grew into a beautiful pea blossom.

Which pea was of most use in the world? Why? [Bring out the point that we must do something for others. Even small and humble things may do God's work.]

Step IV.—Formulation.

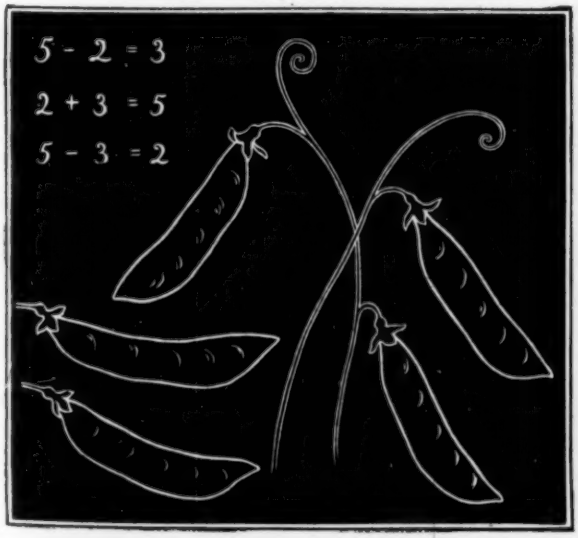
Learn by heart:—

"Content to fill a little space,
If God be glorified."

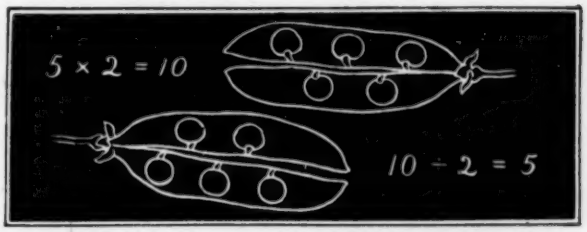
Step V.—Application.

1. **Picture Arithmetic.**—Number 5.

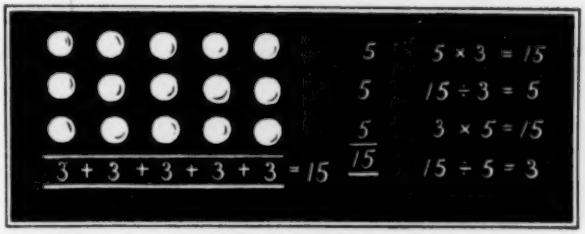
I.



II.



III.



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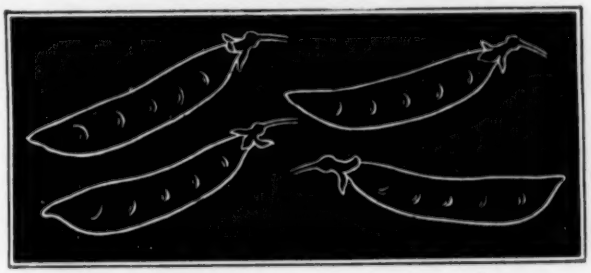


5 PEAS IN EACH POD.
HOW MANY WHEN THE PODS ARE OPEN?

2. **Brushwork.**—Peas in a pod; pea blossom.

3. **Free Drawing.**—Garret window; pigeons.

4. **Clay Modelling.**—Pea-pod; leaves of pea plant; sick girl's bed and chair.

1. Poems relating to germination:—"How do they Grow?" "Waiting to Grow."

2. Tell simply the story of Theocrite* (Browning's "The Boy and the Angel"), and require children to learn portions which illustrate the point that God values humble services.

"Morning, evening, noon and night,
'Praise God!' sang Theocrite.
Then to his poor trade he turned,
Whereby the daily meal was earned.
Hard he laboured, long and well;
O'er his work the boy's curls fell.
But ever, at each period,
He stopped and sang, 'Praise God!'
Then back again his curls he threw,
And cheerful turned to work anew.
Said Blaise, the listening monk, 'Well done,
I doubt not thou art heard, my son—
As well as if thy voice to-day
Were praising God the Pope's great way.'"

Bring out the point that God was as pleased with the praise of the humble boy as of the great Pope. Refer to the simple work of the pea blossom, and its great results.

* This will depend on the discretion of the teacher. The writer has told the story of "The Boy and the Angel" to children of six and seven, and has been pleased with the impression it has made.

3. Learn by heart the poem "Little by Little."

NATURE LESSONS WORKED OUT.

Eggs and Chickens.

STEP I.—PREPARATION.

Aim.—We shall learn to-day about eggs. Show a hen's egg.

What is an egg? What kind of bird laid it?

Refer to the story of the Ugly Duckling, and to the poems and songs relating to eggs and chickens which the children may have learned.

A child may quote,—

"Cluck! cluck! the mother hen
Summons her chickens
To peck the dainty bits
Found in her pickings."

Town children will refer to the boiled eggs at the breakfast table, and to the eggs mother uses in making puddings. Allow the children to express themselves freely upon the subject, and, finally, request them to sum up their ideas in connected narrative.

RECAPITULATION.*—"Eggs are white; a hen lays them. There are also duck eggs, which are green. We make puddings from eggs, and we eat them."

STEP II.—PRESENTATION.

Systematic Observation. (*a*) **Colour.**—The hen's egg shell is white, like chalk. Crumble some chalk and some egg-shell, and observe them. Duck eggs are pale green, and sometimes cream-coloured. (Show specimens of duck eggs.) The children remark immediately that duck eggs are a little larger than hens' eggs.

RECAPITULATION.—Hens' eggs are white. Duck eggs are pale green or cream. They are a little larger than hens' eggs.

(*b*) **Shape.**—Require children to note the form.

The egg is oval or egg-shaped. Refer to the ovals in the outline drawing lessons and the oval shape of some of the leaves. Show a cube, pyramid, and rectangular solid from the Gifts. Show that an oval is a convenient form for the hen to sit upon.

Why should the egg not be round? Because it would roll too easily. Roll a round wooden ball—Gift II. will do for this purpose—and roll an oval egg. Show that the ball rolls much more easily. Round eggs might roll away from the nest.

RECAPITULATION.—Eggs are oval in shape; they have no sharp corners, and they do not roll away easily.

(*c*) **Egg-shell.**—Break an egg into a basin, and examine the shell. The shell breaks easily. It can be crushed into a powder something like chalk dust. Teach the word "brittle." Examine the inside of the shell. It is lined with a tough white skin. Peel off this skin and examine it.

RECAPITULATION.—The shell is hard and brittle; it is lined with a tough, white skin.

(*d*) **Content of Shell.**—Examine the broken egg in the basin, and notice—(1) the clear, whitish, sticky part outside; (2) the ball of yellow yolk inside.

Take a hard-boiled egg, peel off the shell, and show the white oval. Notice (3) the clear, whitish, sticky part has become firm and quite white. You may now roll it gently about without the shell.

Cut the hard-boiled egg in two, and notice that the yellow yolk has become firm, and paler in colour. Notice that it keeps its position in the centre of the white part.

RECAPITULATION.—The egg is made up of a whitish, sticky part and a yellow yolk. The whitish part becomes firm and quite white when boiled; the yolk also becomes firmer, and paler in colour.

This will probably be enough for one lesson.

STEP II. (*continued*).

Aim.—We shall learn to-day where the chicken comes from.

Hatching. (*a*) **Warmth.**—The mother hen sits on her eggs for about twenty days. Why does she do this? To keep them warm: eggs will not hatch without warmth.

(*b*) **Food.**—The little chick begins to form in the eggs as soon as the mother hen begins to sit on them. Each day it gets bigger. It wants no food; the baby chick feeds on the white and yolk of the egg. Refer to the baby bean plant and baby corn plant feeding on the seeds, and to the baby snowdrops feeding on the bulb, if the children have experience of these.

(*c*) **Feathers.**—On the tenth day the feathers begin to form on the baby chick, and as it grows bigger and bigger, it has to curl itself up to find room for itself inside the egg-shell. After about twenty days it gets tired of the shell, and wants to come out. Refer to the story of the baby snowdrop wanting to uncurl itself.

(*d*) **Coming out of the Shell.**—It begins to tap at the shell with its little beak. It pecks harder and harder, and at last it makes a tiny hole in the shell. This hole gets bigger and bigger, until at last the chick creeps out and sees for itself what the world is like.

(*e*) **The young Chick.**—A strong chicken can run about and pick up corn and worms for itself almost as soon as it comes out of the shell. It is not helpless like little baby brother or sister. (A live chicken should be shown.) It is a pretty little creature, with soft, yellow, downy feathers. If it is frightened or cold, it runs to its mother, and she covers it with her wings and keeps it safe and warm.

Recapitulations are given by the children after each head.

STEP III.—ASSOCIATION.

No definite association can be given, as this will in most instances be the first of the series, and the teacher cannot be sure that all the children have sufficient knowledge of any one object to use it as a contrast or comparison. References are made throughout the lesson to the literature—the baby snowdrop wishing to come out of the bulb, and the peas wishing to come out of the pod, and the Ugly Duckling in Andersen's story. The teacher will use the references which correspond to the order in which he takes the stories. If the flower studies and the germination of the wheat and bean have been taken before the animal lesson, the germination of the bean would make an excellent comparison, and the relationship between the plant and animal world could be established.

The independence of the young chicken as he emerges from his shell can be contrasted with the helplessness of baby at home, or of young kittens or puppies.

STEP IV.—FORMULATION.

This may consist of a general recapitulation.

* This summary was given me by a child of six.

STEP V.—APPLICATION, AND SUGGESTED CONNECTIONS WITH OTHER STUDIES.

1. The children must draw ovals on the blackboard—eggs, chickens, birds, and nests according to their stage of development.

2. **Brush Drawing.**—Oval eggs. These may be large or small, and may be coloured green, blue, or speckled to represent eggs of various birds.

3. **Writing.**—Copy writing with teacher from the board.

The egg is oval, and the shell is brittle.

Language Lesson.—Require various children to make sentences on the egg and chicken, and to print their attempts on the blackboard.

EXAMPLE.—Hens lay white eggs. Duck eggs are pale green. Eggs are oval in shape, because an oval is easy for the mother bird to sit on. Egg-shell is brittle; it is lined with tough white skin. Inside the shell are white and yolk. The white is firm when it is boiled. The little chick feeds on the white and yolk until it comes out of the shell, and then it picks up grains and worms for itself.

Reading.—The sentences printed on the board may be used as a reading lesson, and spelling and word-building lessons formed from them.

Word-building. EXAMPLES—

ai	*ee*	*h*
rain	feed	white
grain	need	while
drain	heed	which
train	deed	whom
strain	reed	what
	steed	
	weed	

oi and past tense—

oil	oiled	soil	soiled
boil	boiled	coil	coiled
toil	toiled	foil	foiled

Sentence Writing.—The children may be required to learn to spell various words, and then form sentences, as:—

PRINTED ON BOARD.	WRITTEN BY CHILDREN.
O-val.	*The egg is oval.*
Brit-tle.	*Egg-shells are brittle.*
Ea-sy.	*An oval is easy to sit on.*
Yolk.	*The yolk is yellow.*

Memory or Imaginative Drawing.—If the Nature Studies have been carefully illustrated by the teacher on blackboard, the children can be asked to draw frog spawn, tadpoles, and frogs from memory, or to make pictures of them without copies.

Memory Painting, or Painting from Nature.—Paint the various stages in the development of the young frog.

The studies of eggs and tadpoles may be followed by studies drawn up on the same plan as the following—

The Chicken,	The Duckling,
The Hen,	The Duck,
The Frog,	The Toad—

and a comparison made between the hen and the duck, bringing out the chief differences and resemblances.

These studies may be followed by—

Lambs and Sheep,
Kids and Goats,
Calves and Cows,
Foals and Horses;

and the sheep and the goat, and the cow and the horse, may be suitably compared.

Bird studies may be preferred by some teachers, and the commonest and most familiar must be chosen—

House Sparrow,	Hedge Sparrow,
Cuckoo,	Swallow,
Tomtit,	Sand Martin,
Thrush,	Blackbird—

according to the child's environment. Country and rural schools will naturally have the widest choice.

For town schools the following might be recommended—

1. The Egg, Chicken, Hen;
2. Frog Spawn, Tadpole, Frog;
3. Calves and Cow;
4. Foal and Horse;
5. House Sparrow;
6. Swallow;

or a selection from these.

It cannot be too strongly enforced that it is better to work through two or three studies thoroughly and well than through twenty in a scrappy, general manner; and it is absolutely essential that the children should become perfectly familiar with the real things, and not merely with pictures or drawings. By no means is the value of pictures and illustrations underestimated—they are a necessity in aiding the children to comprehend clearly—but in these early studies a real, concrete foundation is indispensable.

Every town school can procure hens' eggs and a live chicken, frog spawn and tadpoles, and every town child has experience of sparrows, horses, and probably cows.

The teacher will always begin with the original source of child's experiences, and the school instruction should correct, arrange, and supplement these experiences.

INDIRECT MORAL TRAINING.

THE development of character is the aim of all school education, and any lesson or exercise which does not directly or indirectly conduce to this end is not educative, and is therefore out of place in our curriculum. The ultimate aim of our physical education, for example, is not to produce athletes, but to develop a sound and healthy body, fitted in brain and in muscle alike to become an instrument to carry out the highest ideals of the man, and not to act as a drag upon his achievements. There is no virtue which is not more easy to the healthy man than to the weakling, while many vices and faults of character, like those pathogenic microbes of which we now hear so much, find the most fitting soil to breed in where physical weakness or nerve instability exists. A fine physical development does not ensure a high type of moral character, but a defective physical development will render such a character very difficult, if not impossible to attain.

The teacher of the young should be specially alive to the moral value of *health*. The traditional view of the connection between the physical and the ethical—not always expressed, perhaps, but very commonly acted upon—was that the mortification of the body was the best aid to the perfection of the character. The more modern view—not modern in origin, for it is the ancient Greek view, but modern in its application to education

in our land—is the direct contrary to this; it may be expressed in the words that not *mortification* but *fortification* of the body is the best moral *régime*.

To accept this view will not only make the teacher's work more pleasant for herself and for those under her charge, but it will help in some respects to simplify the problems of school work. The body is a much more tangible thing than the mind or the character, and if care of the body is really advantageous to the development of character, the teacher's work becomes less abstract and more practical.

All modern research and tabulated statistics tend to show that the moral weaklings of society, the criminals and the defectives, fall far below the average standard of physical development of the useful citizens. Such average statistics do not, of course, prove anything about any individual child, but they demonstrate with absolute certainty that the fewer physical weaklings we turn out of our schools, the fewer moral weaklings will society be burdened with in the future; or, to put it otherwise, if we can promote the physical well-being of this or that individual, we thereby remove him out of the dangerous class from which the criminals and other failures of society are mainly recruited.

Already we, as educators, have realised that education is the best means at our command for reducing the numbers of the army of criminals, though it is no sure guarantee for its entire abolition. We must add to that belief this further one, that the best possible security for our boys and girls turning out useful and respectable men and women is not merely a well-trained mind, but a healthy and well-developed body. And if we assign to physical well-being a more important place than popular opinion will as yet accord to it, we are merely a little in advance of that opinion, which is rapidly awakening to the importance of this aspect of education.

In considering moral training, therefore, we shall place first among the means at our command the physical care of the child. Normal growth, sound health, and a brain allowed to develop naturally, with all opportunity for nourishment and growth, and an entire absence of strain—a normal healthy and happy childhood is a more potent factor in forming character than all the moral lessons we can ever give.

The *hand-training* which we can give in school has also a very important moral aspect. There is a well-known couplet regarding "idle hands" which suggests to us one of the ways in which handwork is of moral value, even if we do not accept literally the transcendental doctrine implied in it. The rabbinical maxim that "he who teaches not his son a trade teaches him to steal," suggests another aspect in which the practice of handwork touches on the moral sphere. There is in all real handwork an unconscious moral training, and this should be consciously before the teacher all through her school work.

The psychology of handwork needs more consideration than it has hitherto received from writers on education. The essence of handwork is *personal activity*, not mere receptivity. However elementary or humble in form, it therefore develops a certain independence of thought as well as of action which is unattainable otherwise. The boy must *do* the thing himself, and not merely see it done by some one else. And this habit, mental and physical, if carried through the whole of the school curriculum, and out into the wider life beyond the school, would tend more than anything else to correct many of our present-day weaknesses. In business, in social life, and even in sport, the bane of society is the crowds who are content to stand and see *others* do the things that are to be done. The mental, moral, and physical loafer ought to become a less common type if good use is made of the various forms of handwork which are available in school, and if the habits fostered by the handwork are carried into all the other work as well.

A prominent virtue which attaches to all handwork is *truth*. Pretence embodied in words alone may deceive both speaker and hearer, but pretence embodied in material laughs at the worker to his face and leaves him no peace. No logic or grammar will enable a boy to detect a fallacy so readily as the work of his hands. The material either fits or it does not; explanation or excuse is useless. Only truth to model and conformity to laws and conditions will result in a perfect or even a passable piece of work. The boy does not think of this, of course; he only sees that the work is wrong, and must be put right or done over again. But the mental and moral habit so acquired will not cease to act when the manual work is laid aside. And it will continue to act all the more surely and all the more steadily if the teacher conducts all her lessons with the same principle clearly before her mind. There must not be any looseness or pretence in other work to weaken the moral habit which is being silently formed while the handwork is being carried on.

Handwork, again, is *altruistic* in its essence—altruistic as to its psychological tendency, if not in its ethical character. It is natural to all young children to be intensely egoistic, and the mere acquisition of mental knowledge or the performance of physical exercises does not necessarily counteract this tendency. What is learned exists for the *self*. The product of all handwork, on the contrary, exists for *others*—as a fact for others, that is, though not necessarily as a possession. The thing made may be *mine*, in so far as it is my property, but it exists equally *for others*—a visible and tangible thing outside of *me*, for others to see and to admire or to condemn.

In all expression, whether by word or by handwork, the pupil is giving out and not merely absorbing; but in the product of handwork the *social element* is embodied far more really than in any other form of expression. There may be artists who enjoy their creations in private, and will not share the contemplation of them with others; but this attitude is abnormal, and is certainly not that of the child-artist. In him art is as freely altruistic as it ought to be everywhere. His work is a joy to himself largely in the measure in which it meets the approval of others. His handwork is from the beginning, to some extent at least, a working for others. The mental and moral habit thus implied and thereby developed need not be further discussed; its value is evident.

One further benefit which will tell for moral culture we may very well expect to derive from handwork, and that is the habit of looking upon manual work as of *equal dignity with intellectual work*, usually so called. This is a point of view which has much social significance. The pupil who has enough practice in manual work very soon finds that it entails quite as much thought and intelligence as any other school exercise. He sees also that his teacher attaches as much importance to the handling of the grubby modelling clay as to the dainty colour work or the use of books. That

fact ought to give him a useful perspective of the importance of the tasks of real life. School then becomes to him a place where boys are trained not to avoid handwork, but to perform it in the best and most thorough way possible.

This is a moral lesson which we may not feel inclined at first to regard as of much importance in the formation of character, but it is really of the highest value. To esteem life's luxuries above its necessities is a blunder which leads to many moral errors in practical life. Our pupils are certainly in danger of growing up with a false idea of certain classes of work. That some are more worthy of respect than others is no error but a deep truth; the error lies in supposing that the superiority in dignity belongs to what are called "respectable" occupations—and "respectable" in this connection usually means work which can be done in black coat and white linen, without soiling the hands or involving expenditure of the "sweat of the face." In later school life it may be possible to lead boys towards a more just view of the work of life by direct instruction, by showing them that all work which is of real value to the world is "respectable," and that only the occupations which minister to the weaknesses or the vices of men can be called contemptible. In the infant school such teaching would be entirely futile, but the same lesson can be given in a more impressive way. This lesson is being learned wherever handwork is being earnestly done. The teacher, whom we may assume to be one of the models, if not the ideal heroine of her class, is by turns artisan, artist, and teller of tales, and so unites in her person in the most real and practical way the "professional" and the "industrial" elements of adult life.

As regards those moral lessons from manual work in the school, it must be borne in mind that such lessons cannot be given in words. It is not knowledge, but a *habit* of acting, and of thinking, and of feeling, which is the moral outcome of the handwork. If we agree that the aspects of character mentioned are worth cultivating, we must seek to attain them in the only way in which they are attainable—not by talking and teaching, but by active doing. The honest effort to do is all that is needed to teach the lesson; words would only spoil the moral habit and the handwork as well, for it would confuse that singleness of aim—perfection in the work itself—on which so much of the other benefits depend.

Another part of our moral training will be attained by means of what is primarily part of the physical care of the pupil. There is a real truth underlying the proverbial connection between "cleanliness" and "godliness," and the teacher who succeeds in making the former a permanent possession of her pupils should not worry too much over any apparent or temporary failure to secure the latter. It may be that an appearance of the latter virtue is more easy to reach in childhood than the former, but we may suspect that the habit of cleanliness will probably prove the more steady and permanent possession. There is a close mental relation between the scrupulous care of the body as regards cleanliness and that general feeling of self-respect which will make many sorts of vice and meanness impossible to a child. Here also we need no preaching to enforce the moral lesson; it is the *habit* itself which is the moral influence, and not any moralising upon it.

In the simple exercises which we described as "class drill," there is moral training underlying every lesson practised. Habits of order, regard for the rights of others as to their property and their feelings, prompt and cheerful acquiescence in the established social order, and the like, cannot be formed by instruction and explanation. They must be formed by action, and repeated action, as all habits are. If the teacher wishes to give a formal lesson on any of those virtues, that lesson should come after the exercises. She should not deal with rules which are *going to be* observed, but with the meaning and value of rules which are already familiar by practice, and then she will probably find that the lesson has already been learned by the practice better than she could have explained it in words.

There is really little use in such formal lessons. The pupil has not reached the age of reflection. If he has formed orderly habits under the teacher's supervision, her work is well enough done. Her rule and her example are sufficient warrant for the rightness of the habits. We do not wish young children to sit down and meditate on how virtuous they are because they do things in such and such a manner. We simply wish them to form those habits. It is the practical side of morality which can best be dealt with in the infant school, or perhaps in any school. We try to develop the habit of regarding the rights of others, for example, till it becomes a second nature. Regarding the *theoretical* basis of that virtue, philosophers are not agreed; yet the *practical* justification of the habit stands evident in every day's work.

The conventional *forms of politeness* are a valuable means of moral training for children. Ceremonies are never mere forms, especially to the young. They tend to create, or to preserve and strengthen, the feelings of which they are the appropriate expression. The boy who says "Thank you" may not feel much real gratitude, but he is more likely to do so than the boy who habitually omits to say it. The expression is at least a useful reminder of his indebtedness, and its omission is undoubtedly apt to blunt the sense of obligation.

All the little conventional formalities which make up so much of the "minor morals" of daily life are a recognition of the great social principle of our dependence upon others, and of their rights being equal with our own. Social life implies a limitation of absolute personal liberty out of a respect for the equal liberty of others, and the neglect of the forms which express this limitation implies a disregard of others which is a form of social anarchy based on selfishness. We all know the type of man who "rises above social conventions," as he puts it, because of his dislike of "shams" and his extreme regard for "honesty." He will not fetter *his* speech or his actions for the sake of others, but he is all the time demanding that others should curtail *their* liberty out of respect for him or for his ideas. The rise of this type is occasionally due to a need of protest against some form of social pretence, and is to that extent justifiable; it may also arise from a man supposing certain forms to be mere "shams," while they are in fact genuine expressions of feelings to which he is a stranger; it may still more easily arise from a want of respect for others, which shows itself in the omission of the forms appropriate to the feeling of respect. In any case, it is not the type of character which is appropriate to childhood.

As a nation, we err on the side of undervaluing the common courtesies of life. Foreigners of certain lands comment on our boorishness, while we distrust their

politeness. Probably the truth in this aspect of conduct lies in the middle, but in the matter of courtesy we as a nation have not quite reached the middle, and there certainly seems little danger of our ever going to excess. We should be all the more careful to cultivate such forms of politeness as have been able either to take root amongst us or to survive.

The *posture* of our pupils in school has some bearing on their moral training. We are warranted in regarding bodily posture as something not merely physical. The slouching gait and the furtive look are universally regarded as a mark of a low moral type. If we wish our pupils to avoid developing this type of character, undoubtedly our best means of so doing is the simple process of eliminating the physical attitude which accompanies and expresses the character. An upright, alert step and an open look may co-exist with a deceitful type of mind, but the probabilities are all against their doing so. The real character tends to express itself in the physical bearing, and there are some features of character which almost inevitably do so. It is enough, perhaps, for our present purpose to observe that the physical attitude has great influence upon the mental and moral. This is an aspect of the physical constitution which has not received its due place in educational discussions.

Modern physiologists are clear on this matter, that any emotion may be weakened, if not entirely checked, by our refusing to allow it physical expression. If we refuse to frown we cannot remain angry. If we do not shrink physically from pain or danger, the mental shrinking will disappear. We do not run away because we are afraid, but we feel afraid because we have started to run. This is putting the connection in its strongest and most paradoxical way, but it will help to make clear the point of view. It is a view which ought to be before the teacher's mind in her dealings with children, whose mental processes are perhaps more predominantly physical than is the case with adults. If she can insist on the frank look and the firm, unhesitating utterance from her boys, she will make it much less easy for them to deceive her in their words. If they are accustomed to move with alert carriage to their work, any mental disinclination or pre-occupation will tend to disappear.

The general principle underlying this view is a thoroughly sound one. No physical action is merely physical if it is a conscious action. No mental action is purely mental, but implies at least a physical change within the brain. From those two sets of actions, or from those acts with their twofold reference, physical and mental always conjoined, are built up the habits, physical and mental, which have as their result the formation of character. They form the material out of which moral conduct is made, as soon as conscious choice and reflection make the child a moral agent.

PARENTS IN COUNCIL.

BY A "NON-UNION" PARENT.

THE Parents' National Educational Union held its eighth Annual Conference in Edinburgh from the 27th to the 31st May (Friday to Tuesday). This arrangement of time offered two advantages to visitors—the first being that week-end fares were available, and the second that the Scottish Sabbath, or its pale *simulacrum* the Edinburgh Sunday, could be enjoyed, or at least experienced, in the middle of the proceedings. Moreover, it was Assembly Sunday. The rival branches of the Presbyterian Church were in mutually exclusive session, and the supply of clergymen was at least equal to the demand during the period of the Conference.

The meetings were uniformly well attended, the hall being always full and often crowded with audiences of the social type to which the P.N.E.U. specially appeals. The culture effect of such a gathering must be high. We use the word culture in the sense of the old definition—"Culture is what remains after we have forgotten all that we learned at school." The number of papers read makes it absolutely certain that no one could have assimilated all the instruction offered, or indeed could have retained it in the memory under any guise; but the cumulative effect in clearing the point of view and in stimulating the educational interest was undoubtedly great.

The aims of the Union are educational, and its work seems to lie chiefly in the direction of educating the parents. In this its success has been gratifying. Its membership is large, and this means something. When one enrolls himself in a union merely as a parent, *qua* parent and nothing else, it must be assumed that the word is understood by him in something approaching its full connotation. The mere fact of membership, therefore, indicates that the duties of parenthood are being recognised if not fulfilled among many of the wealthier classes, whose children in former days were somewhat of "orphans with both parents living," so far as educative guidance was concerned.

At the opening meeting, after a few introductory sentences by the Earl of Aberdeen, who presided, Dr. A. T. Schofield gave a somewhat original address on "The Education of Character," treating character as the action of the unconscious mind, and tracing the effect upon it of general surroundings and habits rather than of instruction. Of this undoubtedly fine address a lady remarked to a friend that she did not always know exactly what the speaker meant by some of his statements. "Quite so," replied her friend; "I don't suppose the speaker knew what he meant either; but then, you see, that gives one all the more scope for impressive remarks." Professor Arthur J. Thomson's address on "Nature and Nurture" was a closely-reasoned academic proof that heredity does not necessarily render education impossible. The thesis scarcely seemed to require so much proving, but it was well done all the same.

The Saturday forenoon sederunt was occupied by Dr. Leslie Mackenzie, who discussed "Normal Growth in the School Age," followed by Dr. T. S. Clouston on "Nervous Diseases and Symptoms of the School Age," and by Mr. George Smith, M.A., head-master of Merchiston Castle School, on "Development Exercise at School." This was a very terrible experience for conscientious listeners, and was hardly fair to speakers of such eminence in their several special lines. That the papers were excellent goes without saying, but to crush those three into one forenoon, when any one of them would have been a sufficient intellectual problem for the audience, was to be guilty of what Shakespeare calls "wasteful and ridiculous excess."

Discussion was expected to follow as part of the programme; but after listening to the three speakers attentively, no one seemed to have enough mental energy left to ask an intelligent question. The condi-

tion of the reporters who were present was very oddly revealed by the report which appeared in one of the evening papers. Dr. Mackenzie had mentioned that the school dietary at Rugby included for the older boys one pound of uncooked meat. It appeared from the report given that the meat was not only *weighed* but *eaten* in its uncooked state, as one paragraph was headed, "Raw Meat for Schoolboys."

The severe climate of Edinburgh is supposed to be due to two causes—the east wind and the "West End." Of these two, the latter was distinctly favourable to the Conference. The former, however, was in a less genial mood. Accompanied by what one might describe either as "rain" or as "Scotch mist," according to one's nationality, the east wind cancelled the arrangements of the West End for the Saturday afternoon, and the excursions and garden party were "held as read." The Countess of Aberdeen's evening reception, being held indoors, represented the triumph of the more friendly element.

Sunday was scarcely a *dies non* for conference, as special sermons were arranged for in St. George's United Free Church in the forenoon, and St. Mary's (Episcopal) Cathedral in the evening.

The programme for Monday embraced eight items—"Relation of Home and School," by Dr. Burge, headmaster of Winchester School, "Parents and Lessons," by Mrs. Clement-Parsons, and "The Teaching of Mathematics and its Place in General Education," by Mr. T. J. Garstang, M.A., Bedale School, occupying the forenoon. The afternoon provided "Some Hints on Reading with our Children," by the Rev. Dr. Alexander Whyte, St. George's United Free Church, and two very interesting papers on nature study—"Field Excursions in Relation to Nature Study," by Dr. R. Stewart MacDougall, Heriot-Watt College, and "The Educational Value of Observing Nature," by the Rev. Canon Rawnsley. This last, as was to be expected, formed an intellectual treat of the highest order, and one could not but regret that it should come as No. 6 of the day's papers, instead of having at least one session to itself. It is impossible to believe that the best effect of such an address could be attained, however intellectual the audience, when a state of mental repletion, to put it mildly, had resulted from the previous courses of the banquet.

In the evening session, the first business was a paper from the Professor of Music in Edinburgh University, Professor Niecks, Mus. D., on "The Place of Music in Education." The learned professor said a great deal which, if not new, was very obviously true, regarding the teaching of what we call "music" to young people, and the audience, doubtless taught by sad experience, seemed to be in very cordial agreement with the speaker. The destructive seemed to be more appreciated than the constructive parts of the address, but in regard to music teaching even a negative reform is something to sigh for.

Following this came "An Ambleside Evening," a paper on Scottish Ballads, by Miss Dora Thomson, former student at the House of Education, Ambleside, some of the ballads being recited, and others sung by Mr. Marcus Thomson. The ballads were good samples, such as "Sir Patrick Spens." To an audience mostly composed of Edinburgh people they could not be new, but the young lady who recited contrived to introduce a decidedly novel element by her pronunciation of the dialect words. A little gasp of dismay was audible here and there among the audience at first, but they accepted the situation loyally, and if they smiled it was mostly with faces discreetly downcast. The "evening" was thoroughly enjoyed, and all its elements warmly applauded.

The five papers on the programme for Tuesday were "Training in the Service of Man," by Mr. J. Lewis Paton, M.A., head-master of Manchester Grammar School, "The Modern Girl's Demand for Work," by Miss Bannatyne, Glasgow, and "Children and National Ideals," by the Rev. Harry Miller, M.A., in the forenoon; and "A Vital Education," by Mrs. Clement-Parsons, London, and "Some Good Gifts for Children," by the Rev. Dr. Hunter, London, in the afternoon; but it was found necessary to depart somewhat from this arrangement. Mr. Miller's paper was one of the brightest and most practical of the meeting.

To sum up one's impressions of a conference so full of the best material is not easy. The feeling could not be escaped, however, that the congested state of the programme was unfortunate. Many of the papers demanded the closest attention and ample reflection, and would have been all the more effective if followed by adequate discussion; but these, except the first, were impossible. To listen to such papers by the half-dozen or more *per diem* is worse than "doing" a picture gallery on the pretence of studying art.

A very common attitude among the speakers most closely identified with the Union seemed to be opposition to what is known as Child Study. One speaker denounced the attitude of studying a child "as if it were some strange insect." One wonders how such a speaker studies a strange insect, for there is nothing necessarily immoral in such study; one's attitude to *familiar* insects is usually much less suitable for adopting towards children. "Do you understand his sermons?" an old lady was asked, when her favourite minister was under discussion. "God forbid that *I* should understand so grand a man!" was the answer. There is something of this attitude in the creed of the P.N.E.U. That creed begins, "Every child is born a person." This is true, of course, just as it is true that "every person is born a child;" but it is a purely formal truth, and gives as little guidance to education as the statement "all men are born free and equal" does to American politics. What parents and teachers need to know is how this potential personality becomes actual, and how education can influence the *kind* of person which the child is to become.

Happily, however, the practice of the Union is more sensible than such dicta would seem to indicate, and such speakers as Dr. Leslie Mackenzie and Dr. Clouston, to go no farther, who are distinguished specialists in the study of children, contributed a really practical and tangible element to the discussions. At this level we find men who realize the imperative duty of studying children. Whether we study them as strange insects or as familiar vegetables, we *must* know all we can about them if we are to give that aid to their development which is the primary responsibility of parents and of teachers alike.

The officials of the Union and the Edinburgh Committee are to be warmly congratulated upon the success of this Conference. As a propaganda of noble and vitalising ideas, the P.N.E.U. is doing excellent work in its own field.

Next Month:

"TEACHERS WHO HAVE WON THEIR SPURS."

PART I.

Fig. 1.

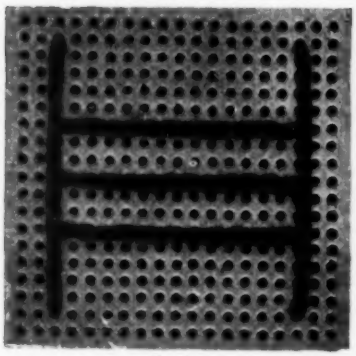


Fig. 2.

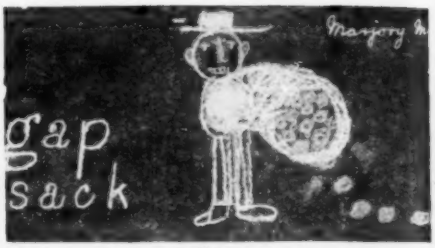


Fig. 3.

Fig. 4.

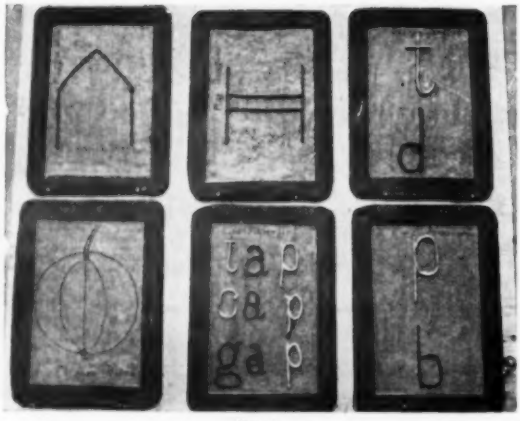


Fig. 5.

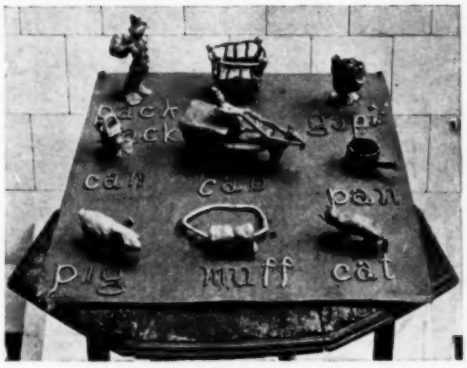


Fig. 6.

THE "THREE R'S" COMBINED WITH HANDWORK.

Fig. 1 (Baby Class), number, form, and colour. Fig. 2 (Baby Class), number, etc., "3 and 2." Fig. 3, Original illustration of "a gap in a sack." Fig. 4, Transition from printed to written character after two weeks' work (brown paper work). Fig. 5, Plasticine work on slates—number, letters, and words. Fig. 6, Plasticine models and words.

OUR MODEL INFANT SCHOOLS.

XXI.—DUNARD INFANT SCHOOL, GLASGOW.

THERE are days in June when it does not rain *much* in Glasgow, and one of these occurred on the date we had arranged for a visit to Dunard Infant School, at the behest of the editor of this journal. From our railway terminus it was a fairly long journey, but the fine electric cars of the Second City make distance a matter of no importance there. One coming from the Scottish capital finds the contrast a pleasant one. We soon found another. Our car stopped at the end of a long line of others, all stationary. "This, at least," we said, "is something familiar. 'Another Breakdown of the Tramway System' is a headline our Edinburgh dailies keep standing." We were wrong. A dray had come to grief and blocked the cars. In Edinburgh it is always the reverse that happens.

But we were within half a mile of the school, and under the guidance of the Superintendent of Drawing, well known to all readers of the *Practical Teacher*, we soon reached the fine, solid-looking building in its spacious playground, and received the genial welcome of the head-master, Mr. J. Wood, and of Miss Campbell, the head-mistress of the infant department.

Ten or twelve years ago, probably one could not have found in Glasgow an infant school which would have repaid a visitor for a journey even as long as ours had been. Much has happened in the infant school within that period, however, and there are in the city not a few schools where the teachers have taken full advantage of the freedom which they now enjoy as to programme and methods. Those teachers have proved abundantly that all imposition of regulations from without tends to stifle rather than stimulate, and that the only hope of real education in any school lies in the skill and devotion of the teachers. True, the difference between school and school tends to increase, but this is due to the upward growth of the best, and not to any lowering of the average level.

Dunard Infant School is a case in point. So markedly have this and one or two other schools risen in the scale of efficiency and all that is desirable in infant teaching, that the Board make a regular practice, we believe, of sending to these schools for a time the assistant teachers who are next to be promoted as head-mistresses of other infant schools. This is at once a mark of high honour to the selected schools, and a proof of enlightened management by the Board. There is no surer way of levelling up the schools than by securing that each new head teacher shall have had experience under those of proved superiority.

It is matter for regret that while the Board have thus made wise provision for the supply of first-rate infant teachers, they have also taken steps to cut off the supply of pupils by refusing to provide accommodation

Fig. 7.
The "Children's Garden" of the Second Highest Class.

for children of four. They have, doubtless, good financial excuse, if not reason, for their action, but educationally it is a blunder. There can be but a small proportion of homes in the city where children of four can be better cared for in every way than they are in an infant school of the type we are discussing.

We have no intention of going minutely into the methods of work in Dunard School. Many of them are, naturally, such as one finds in most first-rate institutions. We can find room only for a few notes on what impressed us specially during our too brief visit.

In the first place, we were struck by the fact that no "subjects" are taught. The lines of division that usually mark off reading, writing, drawing, etc., from one another simply do not exist. The whole activity of the child is turned upon each of the traditional and other subjects, and the education is therefore a unity and not a congeries of lessons.

We may take Reading as an illustration. Miss Campbell, we may explain, bases her teaching of reading on Nelly Dale's method, or rather we should say that Miss Campbell's method first found books to suit it when Miss Dale's appeared. A phonetic system almost identical had been evolved and practised by Miss Campbell, but she had neither been discovered by nor had discovered herself to any enterprising publisher, and so, when these books appeared, Miss Campbell found in them, for the first time, material which suited her methods.

The reading lesson, then, may be found associated with the most varied forms of activity or instruction. Simple gymnastics of the vocal organs—opening the mouth, moving the tongue, etc.—are found very useful. Pictures are largely used illustrating some simple story, adapted or made up, to introduce and familiarise some word or words of the sound to be studied. Dramatic reproduction of the story by a group of the children serves this end still further. Some of these little plays are intensely amusing, and are evidently enjoyed by the actors no less than the spectators. The formal word-study, or reading lesson proper, is carried out with all the aids proper to the system. The reproduction of the letter forms and word forms also makes use of many varied activities. For the very young pupils, neat little wooden trays, or shallow boxes with clean white sand, make admirable drawing surfaces, where the letter drawn can be obliterated and the surface prepared again by a gentle shake of the tray. Another exercise is performed with nicely tinted plasticine and ordinary slates. The plasticine is rolled out with the hand into thin rods, and the words are built up on the dark background of the slate, to which the plasticine adheres lightly.

Free drawing with soft crayon on brown paper, on a large scale, is another means of reproducing the lesson. This drawing, as well as the other copying exercises, is done at first in the printed characters. The written characters are not introduced for some time, until the forms and powers of the letters, and a fair stock of simple words, are thoroughly familiar. Then the exercise takes the further shape of translating the printed into the written word. Writing, it may be said, is thus incidentally learned, without any of the preliminary pot-hooks and elements of letters being needed; and the command of the written forms gained in two or three weeks is at least equal to a year's "copy-book" practice, to say nothing of the saving of dry and

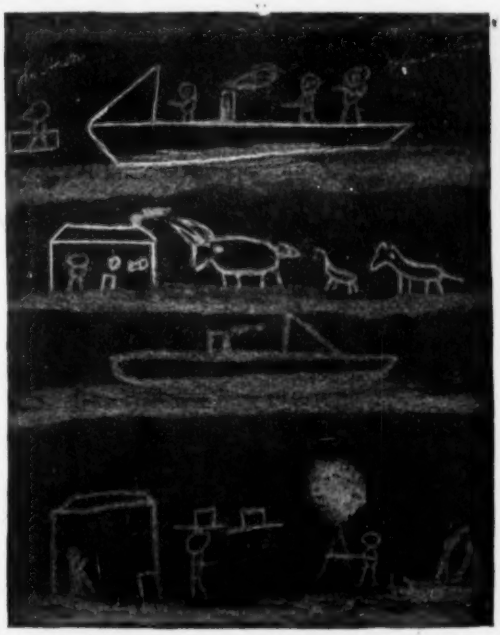


Fig. 8. Pictorial Composition by a Child of Five.
Drawn in chalk. Subject—Scenes from "Robinson Crusoe."

often painful work common in the older method, and with an obvious saving of strain to young eyes, and of

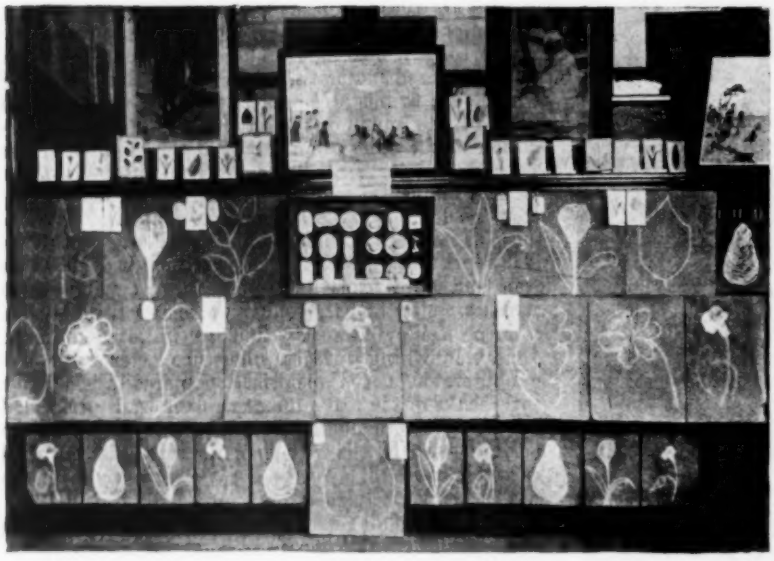


Fig. 9.

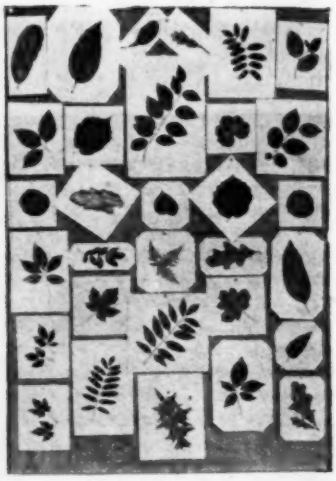


Fig. 10.

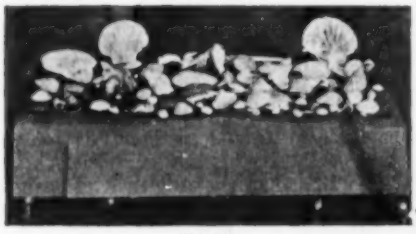


Fig. 11.

Fig. 12.

NATURE STUDY.

Fig. 9, Firearm and brush drawing and modelling, highest class. (Besides these there are numerous drawings recording observations of the growth of these plants.) Figs. 10 and 11, Collections of leaves and shells belonging to highest class, used for drawing, modelling, and object lessons. Fig. 12, Section of highest class at nature study.

the disappointment which results from all precocious attempts at minute accuracy.

Our attempts to trace any other "subject," such as Drawing, led us similarly into every department of school activity. There is the absolutely free drawing, in the form of illustrating some familiar story. We found no danger here of looseness and inaccuracy being developed, as the same children were at other times drawing letter-forms, natural forms, and ornament, from copy and spontaneously. The interconnection of subjects is all-pervading, with the result that the children grow up with an all-round development of powers which would be unattainable otherwise.

One of our most pleasant "impressions" was connected with nature study. There is a "children's garden." It is difficult to locate geographically, however. It is all over the school. Every child is the happy possessor of a flower-pot, and 463 flower-pots amount to a pretty fair area of cultivated soil. We may allow four of them to a square foot, and then we figure them out as equal to a border 3 feet wide and 40 feet long; or, since 3 feet is too wide for tiny gardeners to command, we may put it as 1½ feet wide and 80 feet long. It would be difficult in a city school to secure a flower border of this size, probably; yet here it is, with the advantages of being portable, divisible, secure from wind and frost, and when necessary capable of being taken home. It is a garden where the weather is always fair, and the flowers can be studied at leisure without the inconvenience of cold and wet. Then its beauties are not wasted on the desert air of a playground while work is going on. It fills shelves and window sills with colour, and decorates where decoration is most needed and most appreciated. Certainly it is a garden with qualities of its own.

The cultivation of this composite garden is in the hands of the children, who select their plants, watch their growth, study them as living things, and find in them material for nature lessons, drawing lessons, colour lessons, modelling lessons, and other lessons which they learn all unconsciously. We are glad to be able to show a photograph section of this admirable garden, and to give a list of the plants which it contains this summer.

Story-telling, an indispensable part of a good infant school programme, is made full use of by Miss Campbell. The story is not only a means of passing a pleasant half-hour, but is used for at least two definite educative

purposes—to cultivate and develop the imagination, and to give the children a command of the mother tongue. That is to say, the children not only listen to the stories—they listen so as to grasp thoroughly and understand the incidents; they are trained to visualise these, and to represent them in rough sketches on paper; and they are trained to reproduce them orally in connected and fluent narrative, by no means stilted or artificial, but free from localisms of pronunciation or construction. Here we have the same blending of "subjects," with advantage all round—cultivation of memory and imagination, free drawing practice, and the best possible exercise in English composition. The results of this exercise were charmingly illustrated when a modest little maiden came out with her tiny picture-book, her own work entirely, and, as she turned over the pages showing scene after scene in a recently studied fairy tale, related the whole story in language which was marked by perfect propriety without any of the "got up" stiffness which often mars such exercises. One could not but feel that these children were on the fair way towards learning to speak their mother tongue—a somewhat rare accomplishment, after thirty years of universal education!

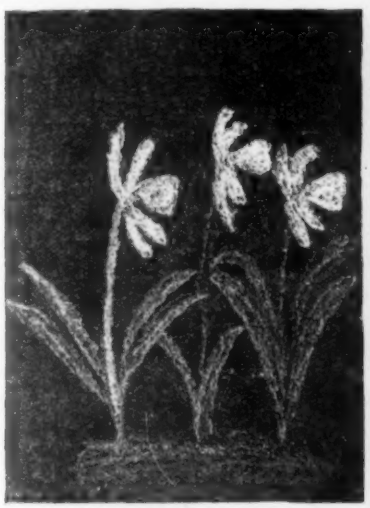


Fig. 13.

Fig. 14.

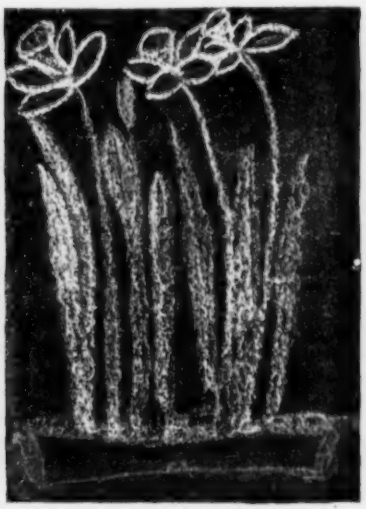


Fig. 15.

Three Drawings on Brown Paper from same Dish of Daffodils.

The way in which Miss Campbell was led to adopt her very successful method of language or composition teaching is so interesting that we feel we must give an account of it in her own words as nearly as possible:—

"At first I attacked composition in the orthodox fashion. After a time I felt it was simply a bore, and I seemed only to be training the verbal memory. Just then I picked up a book of short stories, and there I read of a Dutch designer who came to England to practise his art, and fell in love with an English dressmaker. His halting speech hindered his wooing sadly, for he could not speak the English language well. One day the little dressmaker was knocked down by a passing vehicle, and was taken to a hospital. The hero in some way got to know of the accident, and on making daily inquiries at the hospital, instead of sending in a message in broken English, he made a little sketch of what he wanted to say!

"When I got that length I said, 'The very thing I am looking for.' There and then I made a very rough sketch of a short story. Next 'composition' lesson was received with intense delight, and at the end the question was asked, 'When are we to have another?' Although I was quite sure I had found a way to the heart of my children, I was not certain it would be looked upon with favour as a method of teaching; so I said nothing about my discovery, and I think it was quite a year before it was found out I had strayed from the dusty highway.

"Since then I have gone on using the universal language, drawing and modelling, to explain everything that can be explained to a little child."

It is very difficult to say all that one would like to say regarding Miss Campbell and her work, without using language which is more commonly the vehicle of flattery than of simple fact. Yet her own personality cannot be entirely ignored, as it formed one of our strongest "impressions." We concluded that her success is largely, of course, due to enlightened views of education—that is obvious—and largely to the fact that her work is also her highest pleasure: she lives for her school. There is, however, an additional factor which is of great importance in the result, and that is the fact that Miss Campbell is an artist. Probably she would demur to this statement; if so, we are quite ready to apologise, but not to withdraw. This artistic factor emerges everywhere in the school work. To begin with, the classrooms are full of large water-colour drawings, many of them striking in conception and masterly in execution. They illustrate everything, from the facts of arithmetic to the fancies of the fairy tale. They are just such pictures as children love and understand. Though they are not used as models to copy, their bold and simple outlines and strong, harmonious colour impress the children unconsciously, and have an undoubted æsthetic value.

The same factor has its outcome in the fertility of resource which leads to so many forms of handwork being used to visualise facts and to reinforce memory. It is the determining factor in the kind of training which the children receive, and it is probable that if any teacher without this type of mind were to adopt

DUNARD STREET PUBLIC SCHOOL—INFANT DIVISION.

MORNING MEETING.

		9.10 to 9.25.	9.25 to 9.30.	9.30 to 9.50.	9.50 to 10.	10 to 10.40.	10.40 to 11.10.	11.10 to 11.20.	11.20 to 11.30.	11.30 to 12.	12 to 12.30.
MONDAY.	Class I.	PREPARATION OF MATERIAL.	ASSEMBLING AND CLOAKROOM.	RELIGIOUS INSTRUCTION.	REGISTRATION.	Vocal Gymnastics and Reading.	Number.	INTERVAL.	SINGING.	Writing.	Deep Breathing & Drill.
	,, II.						,,			,,	(G.) Hand & Eye Occup.
	,, III.						,,			,,	(G.) ,,
	,, IV.						,,			,,	(G.) ,,
	,, V.						,,			,,	(G.) ,,
	,, VI.					Conversation & Kindergarten Game.	Number and Gift Play.			11.30 to 11.40. Deep Breathing & Swedish Drill.	11.40 to 12. Hand & Eye Occupation.
	,, VII.										,,
TUESDAY.	Class I.					Vocal Gymnastics and Reading.	Number.			Same as Monday.	Singing.
	,, II.						,,				,,
	,, III.						,,				,,
	,, IV.						,,				,,
	,, V.						,,				,,
	,, VI.					Conversation & Kindergarten Game.	Number and Gift Play.			Same as Monday.	11.40 to 12. Hand & Eye Occupation. Singing.
	,, VII.										
WEDNESDAY.	Class I.					Revision.	Number.			,,	Hand & Eye Occup. (B.). Deep Breathing & Drill. Hand & Eye Occup. (B.).
	,, II.						,,				,, (B.).
	,, III.						,,				,, (B.).
	,, IV.						,,				,, (B.).
	,, V.						,,				
	,, VI.					Conversation & Kindergarten Game.	Number and Gift Play.			,,	11.40 to 12. Hand & Eye Occupation.
	,, VII.										,,
THURSDAY.	Class I.					Vocal Gymnastics and Reading.	Number.			,,	(G.) Hand & Eye Occup.
	,, II.						,,				(G.) ,,
	,, III.						,,				(G.) ,,
	,, IV.						,,				(G.) ,,
	,, V.						,,				(G.) ,,
	,, VI.					Conversation & Kindergarten Game.	Number and Gift Play.			,,	11.40 to 12. Singing. Hand & Eye Occupation.
	,, VII.										
FRIDAY.	Class I.					Vocal Gymnastics and Reading.	Revision.			,,	(G.) Hand & Eye Occup.
	,, II.						,,				(G.) ,,
	,, III.						,,				Deep Breathing & Drill.
	,, IV.						,,				(G.) Hand & Eye Occup.
	,, V.						,,				(G.) ,,
	,, VI.					Conversation & Kindergarten Game.	Number and Gift Play.			,,	11.40 to 12. Hand & Eye Occupation.
	,, VII.										,,

AFTERNOON MEETING.

		12.30 to 1.25.	1.25 to 1.30.		1.35 to 2.5.	2.5 to 2.25.	2.25 to 3.5.	3.5 to 3.10.	3.10 to 3.40.	3.40 to 4.
MONDAY.	Class I.	INTERVAL.	ASSEMBLING AND CLOAKROOM.	Classes I. to V., 1.30 to 1.35 — REGISTRATION — Classes VI. and VII., 1.30 to 1.40.	Eye Drill and Word Building.	Freehand Drill and Picture Lesson.	Drawing.		Optional Work. Hand & Eye Occupation.	CLERICAL WORK AND PREPARATION OF MATERIAL.
	,, II.						,,		,,	
	,, III.						,,		,,	
	,, IV.						,,		,,	
	,, V.						,,		,,	
	,, VI.				1.40 to 2.10. Observation Lesson.	2.10 to 2.30.	2.30 to 3.10. Drawing and Marching.		Dismissed.	
	,, VII.					,,	,,		,,	
TUESDAY.	Class I.				Same as Monday.	Deep Breathing and Nature Lesson.	Recitation.		Hand & Eye Occupation. Optional Work.	
	,, II.						,,		,,	
	,, III.						,,		,,	
	,, IV.						Recitation and Drill.		,,	
	,, V.						Recitation & Game.		,,	
	,, VI.				Same as Monday.	,,	2.30 to 3.10. Recitation and Game.		Dismissed.	
	,, VII.						,,		,,	
WEDNESDAY.	Class I.				,,	Freehand Drill and Story Telling.	Drawing.		(G.) Hand and Eye Occupation (or B.).	
	,, II.						,,			
	,, III.						,,			
	,, IV.						Drawing & Marching.			
	,, V.						,,			
	,, VI.				,,	,,	2.30 to 3.10.		Dismissed.	
	,, VII.						,,		,,	
THURSDAY.	Class I.				,,	Deep Breathing and Nature Lesson.	Recitation.		Hand & Eye Occup. (B.).	
	,, II.						,,		,, (B.).	
	,, III.						,,		,, (B.).	
	,, IV.						Recitation and Drill.		,, (B.).	
	,, V.						Recitation & Game.		,, (B.).	
	,, VI.				,,	,,	2.30 to 3.10. Recitation and Game.		Dismissed.	
	,, VII.						,,		,,	
FRIDAY.	Class I.				,,	Varied	Occupation.		Hand & Eye Occup. (B.).	
	,, II.					,,	,,		,, (B.).	
	,, III.					,,	,,		Optional Work.	
	,, IV.					,,	,,		Hand & Eye Occup. (B.).	
	,, V.					,,	,,		,, (B.).	
	,, VI.				,,	,,	2.30 to 3.10.		Dismissed.	
	,, VII.					,,	,,		,,	

the same plans, the result would be a mechanical formalism instead of a living power.

Needless to say, the arrangement and the decorations of the classrooms bear the impress of the same mind. It is a pleasant place to visit, and must be a pleasant place to work in. This is no passing phrase of compliment. Only those who understand children and love them can appreciate the educative power which arises from a pleasant environment, and in no school is such an environment more essential than in the gloomy, colourless cities of our industrial age.

So much for our "impressions" of Dunard Infant School. If "Mr. Editor" really wishes a detailed analysis of the work and its methods, we begin to think another visit—perhaps another visitor—will be necessary, for all the time and space at our disposal have been used up in the reception and the expression of these few impressions of the excellent work done there.

It must not be concluded from our statements regarding the interweaving of subjects that Miss Campbell works without definite plans. So far is this from being the case, that if one were merely to consult her schemes of work and ignore the spirit in which they are administered, one might suppose that the school suffered from too methodical an arrangement and subdivision of work. But there is an art which conceals art. While everything is linked to everything else in actual practice, everything is also distinct in the supervising mind. We therefore add some of the schemes of work which are followed, after having already shown how their realisation impresses the onlooker.

(To be continued.)

ARITHMETIC IN THE INFANT SCHOOL.

THERE is a danger in the modern infant school that games and interesting occupations may be allowed to assume so much importance that they cease to be regarded as a means to an end. Formerly some subjects, such as arithmetic, were taught as though the object of school life was to convert the child into a calculating machine, and so long as correct answers were obtained it mattered little what processes were employed. The province of infant school arithmetic is to give the child a clear conception of number and of the simpler relations between numbers. In so doing it is possible to do much towards developing the reasoning powers, and if suitable games and occupations are associated with the teaching, the work will be both easy and pleasant.

It is impossible in the short space of this paper to deal with this subject in anything like completeness, but we venture to give a few suggestions in the hope of assisting our readers not only to make the number lessons interesting, but to lay a true and solid foundation for later work in this subject.

In the first place, the teacher must realise that number is *abstract*, and, like other abstractions, it must be taught through the concrete. We may safely assume that all children, by the time they come to school, have the idea of *one*; they can recognise an individual thing as apart from a group. Some have had a certain amount of care bestowed on them at home, and have many ideas of number, but the teacher generally has to teach the number *two*. We will take this as a sample, and set out the steps necessary in dealing with it. The idea of two is formed by synthesis, by placing one object by the side of a similar object—one pencil and another pencil, one marble and another marble. It is advisable also to put together two units which on juxtaposition become continuous—for example, two feet of chalk line on the blackboard, or two pints of water. Confirmation of the idea is obtained by taking away the objects one at a time.

Groups of two things must be given for recognition—for example, two dots, two fingers, two pens, a line two feet long (which can be measured with a footrule). Great variety of illustration is needed in order to make quite clear that number is not confined to pens or whatever single object a teacher might use. The next step is to use contrast, and compare two objects with three, four, etc. Finally, care must be taken to show that number is independent of position—that two pennies may be placed side by side, one in front of the other, or one over the other, and we still have two. This point is more important when we deal with larger numbers. Three objects may be placed in a straight line, or in a triangle, and practice must be given in both. The higher numbers may be illustrated in a variety of ways, and their composition thus taught.

A distinguished writer on the subject of teaching arithmetic advances the theory that "counting is not calculating." On this point we beg to differ. The very word calculating is derived from the Latin word *calculus*, "a pebble," and means literally counting by means of pebbles. Hence counting forms the basis of calculating, and the power of giving the sum of two numbers is developed by practice in various ways of counting. The simplest practice consists in repeating the natural numbers, 1, 2, 3, 4....; next comes the practice of the even numbers and the odd numbers. Later on, children will acquire the habit of counting by threes, fours, etc.

Number cards are very useful in teaching the composition of numbers, and particularly the idea of one number as the sum of two others. This relation is made use of in teaching addition, but is commonly ignored in teaching subtraction. The result is that children are made to imagine that they have new difficulties to encounter, and a new rule to learn, when in fact they have only to regard this sum-relation from another point of view.

Suppose we take as an illustration the fact—

3 and 2 are 5. (*a*)

Given the first two numbers, children give 5 as the sum. But suppose the second is the missing number—

3 and [ ] are 5,

it is every bit as easy for a child to supply this, and why should teachers insist on children putting the fact in a different form and saying, "3 away from 5 leave 2"? The knowledge of the fundamental fact (*a*) above, enables the child to work addition and subtraction with equal ease. That this is the natural method of calculating is shown by the fact that it is the method adopted by shopkeepers in giving change, and by bankers and others in striking balances, and this in spite of the efforts of their school teachers to bring them up in different habits.

Whatever method be adopted in teaching subtraction, the earliest examples should never contain a digit in the upper line greater than the digit beneath it.

SCHEME OF WORK FOR AN INFANT SCHOOL (TO COVER ONE YEAR).

CORRELATED WITH VARIOUS KINDERGARTEN OCCUPATIONS.

By Miss E. Mona Clay, Inspector and Organising Mistress, Manchester Education Committee, and Miss G. F. Sweeney, Kindergarten Mistress, Barry Education Committee.

			Story.	Nature Lesson.	Kindergarten Game.	Clay Modelling.	Brush Painting.	Paper Cutting.	Drawing.	Stick Laying.	Crayon Work.	Building, Gift IV.
AUTUMN.	SEPT.	Week 1.	The Golden Touch.	Wheat.	We are the Reapers We.	Ear of Wheat.	Ear of Wheat.	Sickle.	Barn.	Gate.	Ear of Wheat.	Barn.
		2.	Amelia and the Dwarfs.	Harvest Flowers.	,,	Poppy Head.	Corncockle.	Flower Basket.	Poppy.	Flower Vase.	Poppy.	Field.
		3.	Soup on a Sausage-peg.	Harvest Mouse.	The Mill by the Rivulet.	Mouse.	Mouse's Nest.	Mouse.	Mouse and Nest.	Corn Stack.	Mouse.	Memory Work.
		4.	The Johnny Cake.	Bread-making.	,,	Loaf of Bread.	Loaf of Bread.	Miller's Cap.	Windmill.	Bread Pan.	Loaf of Bread.	Oven.
	OCT.	Week 1.	The Plum's Story.	The Plum.	Autumn Game.	Plum.	Spray of Plums.	Plum and Leaf	Spray of Plums.	Jam Pot.	Plum and Leaf.	Wall.
		2.	The Sleeping Apple.	The Apple.	,,	Apple.	Apple and Leaf.	Ladder.	Apple on Spray.	Ladder.	Basket of Apples.	Steps.
		3.	Wait and See.	Hips and Haws.	Equal Treading.	Hips.	Sprays of Hips and Haws.	Rose Leaf	Hips and Haws.	Basket.	Hips and Leaves on Spray.	Basket.
		4.	Story of the Year (Autumn).	Acorns.	,,	Acorn in Cup.	Spray of Acorns.	Oak Leaf.	Acorn.	Oak Tree.	Acorns on Spray.	Memory Work.
WINTER.	NOV.	Week 1.	The Thrifty Squirrels.	The Squirrel.	Within the Wood are many Trees.	Acorn (memory).	Design with Acorns.	The Squirrel.	The Squirrel.	Railings round Wood.	The Squirrel.	Free Building.
		2.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
		3.	Brer Rabbit. Selection from Black Beauty.	The Rabbit. The Horse.	The Blacksmith.	Carrot. Horse Shoe.	Rabbits in Field. Design with Corn	Carrot. Horse Shoe.	The Rabbit. Stable.	Rabbit Hutch. Manger.	Rabbit with Carrot Horse.	Rabbit Hutch. Stable.
		4.	Vulcan the Mighty Smith	The Blacksmith.	,,	Anvil.	Horse Shoe.	Hammer.	Bellows.	Anvil.	Blacksmith.	Fireplace.
	DEC.	Week 1.	Goody Two Shoes.	The Cobbler.	The Cobbler.	Shoe.	Original Design.	Awl.	Boot.	Bench.	Boot.	Bench.
		2.	,,	The Postman.	The Postman.	Pillar Box.	Letter Bag.	Pillar Box.	Postman's Cap.	Letter.	Pillar Box.	Post-Office.
		3.	Story of the Year (Winter).	Holly and Mistletoe.	Ring Games.	Mistletoe.	Holly.	Christmas Stocking.	Mistletoe.	House.	Holly.	Church.
		4.	Holidays.	,,	,,	,,	,,	,,	,,	,,	,,	,,
	JAN.	Week 1.	Holidays.	,,	,,	,,	,,	,,	,,	,,	,,	,,
		2.	The Birds' Christmas.	The Robin.	Little Jack Frost.	Nest and Eggs.	Branch of Tree.	The Robin.	Robin.	A House.	Robin in Snow.	House with Window Sill.
		3.	Little Match Seller.	Ice and Snow.	,,	Snow Shovel.	House with Snow.	Snowflakes.	Snow Man.	Simple Stars like Flakes.	,,	Pond.
		4.	The Miner.	Coal.	The Miner.	Coal Bucket.	Shovel.	Pick.	Pick and Shovel.	Coal Truck.	Miner's Lamp.	Shaft.
SPRING.	FEB.	Week 1.	The Signalman's Son.	The Train.	"There goes the Train."	Engine.	Flags.	Signal.	Train.	Railway Shed.	Lantern.	Platform.
		2.	The Awakening.	Snowdrops.	"The Spring has called Us."	Bulb.	Snowdrops.	Bulb.	Flower Pot with Snowdrops.	Flower Pot.	Snowdrop.	Flower Bed.
		3.	Story of the Year (Spring).	Crocuses.	,,	Flower Pot.	Crocus on Bulb.	Crocus.	Crocus in Pot.	Garden Gate.	Crocuses.	Garden Walls.
		4.	Clytie.	Daffodils.	Ring Game.	Daffodil and Bulb.	Daffodils.	Leaves in Green Paper.	Daffodil.	Water Can.	Daffodils.	Free Building.
	MARCH.	Week 1.	The Meeting of the Winds.	Wind.	The Weathercock.	Windmill.	Trees.	Sails of Windmill.	Clothes on Line.	Kite.	Boat sailing on the Sea.	Windmill.
		2.	Psyche's Task.	Seeds and Rain.	Raindrops.	Water Butt.	Umbrella.	Spade.	Wheelbarrow.	Window Box.	Umbrella.	A Well.
		3.	The Cow that lost her Tail.	The Cow.	Come, come to the Farmyard.	Milk Pail.	Clover.	Clover Leaf.	Milking Stool.	Cow Shed.	Cow.	Shed.
		4.	How a Little Boy got a New Shirt.	Sheep and Lamb.	,,	Trough.	Turnips.	Sheep.	Turnip.	Hurdles.	Sheep.	Sheepfold.
	APRIL.	Week 1.	Story of Speckle.	Hen and Chickens.	Hen and Chicks.	Hen Egg.	Chicken.	Hen.	Fowl House.	Speckle's Box of Eggs.	Hen and Chickens.	Fowl House.
		2.	The Ugly Duckling.	Duck and Ducklings.	,,	Water Dish.	Pond with Reeds.	Duck.	Duck.	Fowl House.	Ducks on Pond.	Fowl House (mem.)
		3.	Meek and Lowly.	The Primrose.	Nosegay of Flowers.	Primrose Leaf.	Primroses.	Primrose Leaf.	Vase.	Watering Can.	Basket of Primroses.	Pathway.
		4.	Little Ida's Flowers.	The Bluebell.	,,	A Bell.	Bluebells.	Basket.	Bluebell Plant.	Sofa (in story).		Bed (in story).
SUMMER.	MAY.	Week 1.	The Stickleback.	The Stickleback.	The Fishes.	Fish Bowl.	Fish.	Fish.	Stickleback's Nest.	Minnow Net.	Fishes in Water.	Octagonal Pond.
		2.	The Snail & the Rose Tree.	The Snail.	Thus the timid, shining	Snail.	Snail on Leaf.	Cabbage Leaf.	Snail on Cabbage.	Garden Wall.	Snail on Leaf.	Memory.
		3.	The Frog Prince.	The Frog.	The Little Frogs. [Snail.	Stages of Development.	Tadpoles in Pond.	Frog.	Life History of Frog.	Railings round Pond.	Frog.	Pond with Island for Frogs.
		4.	The Rose Elf.	Wild Rose.	Ring Game.	Flower Basket.	Wild Rose.	Rose Leaf.	Wild Rose.	Window in Summer House.	Spray of Roses.	Summer House.
	JUNE.	Week 1.	Five out of one Shell.	Sweet Pea.	Revision of Games.	Open Pea Pod.	Sweet Pea.	Pea Pods.	Open Pod.	Pod.	Sweet Pea & Pod.	House.
		2.	Story of the Year (Summer).	Cherries.	,,	Cherries.	Cherries on Spray.	Cherries.	Parts of Cherry.	Tree.	Cherries.	Free Building.
		3.	,,	Strawberries.	Ring Game.	Strawberry.	Strawberries.	Strawberry Leaf.	Strawberries.	Jam Pot.	Strawberry on Plant.	Strawberry Bed.
		4.	,,	Currants.	,,	Currants.	Spray of Currants.	Currant Leaf.	Spray of Currants.	Currant Leaf.	Currants on Spray.	Memory.
	JULY.	Week 1.	A Lesson on Faith.	The Butterfly.	The Caterpillar.	Caterpillar.	Butterflies.	Butterfly.	Caterpillar on Branch.	Butterfly Net.	Butterfly on Flower.	Doorway for Chrysalis.
		2.	A Narrow Escape.	The Bee.	Hum, hum, hum.	Beehive.	The Bee.	Bee.	Beehive.	Stool for Hive.	Bee on Flower.	Beehive.
		3.	Amelia and the Dwarfs.	The Hayfield.	The Haymakers.	A Hayfork.	Grasses.	Haycocks.	Haystack and Ladder.	Ladder.	Haycock.	Field.
		4.	The Daisy.	Moon Daisy.	,,	Daisy.	Daisies.	Flower Pot.	Moon Daisy.	Cage (in story).	Daisies.	Hayfield (memory).

The mental (or oral) work in connection with the annexed example should be as follows :—

3 and **2** are 5 ; 865
2 and **4** are 6 ; 723
7 and **1** are 8. 142

By proceeding in this way we follow the method adopted in addition in which the earlier examples contain no carrying figures. Later on we introduce addition with carrying figures :—

9 and 3 are 12 ; set down 2 and carry 1. 23
1 and 4 are 5, and 2 are 7. 49
72

When the child examines his answer, he is never at a loss to understand the 2 in the right-hand place ; he never says that his result is wrong because it is impossible to get 2 by adding 9 and 3 together. He knows very well that the 2 is only the unit digit of the sum of 9 and 3, because one of the numbers alone is greater than 2.

Now let him work the following. If he knows the above fact in one case, how absurd it is to say that he will raise his ignorance of it as an objection to working in a rational way in the other! It is perhaps necessary to remind him of it in the case of subtraction, but with very little practice he will set to work straight away and say as in the previous example,—

72
49
23

9 and 3 are 12 ; carry 1.
1 and 4 are 5, and 2 are 7.

The old illogical plan of *borrowing* is dying, but still lingers. The other methods of teaching subtraction—namely, by decomposition, and by equal addition—are logical but very difficult for a child to grasp intelligently. We do, therefore, press upon teachers in our infant schools who have not given the above method—complementary addition, as it is called—a trial, that if they will only adopt it, they will not only simplify the later work in arithmetic, but will make the infant school work of subtraction itself very much easier.

EXPLANATION OF THE SCHEME OF WORK FOR AN INFANT SCHOOL

(To Cover One Year), Correlated with Various Kindergarten Occupations.

This scheme of work is offered as a suggested one for a year, and as being suitable for the various classes in an infant school. The story for each week is made the central point round which the nature lesson and occupations are grouped.

It is not, of course, intended that the six occupations for which illustrations are given should necessarily be taught during one school year, but they serve as examples—from which choice could be made—of the way in which they might be made a means of education in giving expression to certain ideas in the story or nature lesson, and as affording the needed respite from head-work pure and simple, so necessary with little children.

Paper Folding.—Paper folding has been excluded from the correlated course, since illustrations cannot always be carried out without forcing the connections or destroying the progressive nature of the work. It would, however, be possible to adopt a symmetrical or geometrical course in paper folding which Classes I. and II. (ages six and five) might well work out.

Building.—An illustration is given each week for building with Gift IV. This is suitable for Class III. (age four years). The buildings are such as may also be easily made with Gift III. for Class IV. (babies).

Clay Modelling.—With regard to clay modelling, which is the handwork most generally in use throughout an infant school, the object given in the illustration could be modelled by Classes I. and II., while Classes III. and IV. should at least attempt the general shape. This affords the teacher an opportunity of speaking of the object in hand, directs the children's notice to it, and in executing the work helps them to get a certain needed control in the use of the muscles of the hand, not to speak of the very great importance of the effect of motor activity upon the mind.

It is not expected—or at least it ought not to be expected—that the thing modelled should be perfect ; the object of such work is gained if the hands are trained, observation cultivated, and the power of direction and of muscular control increased. Classes I. and II. would model the object in a more or less detailed form, while the work of Classes III. and IV. would be more or less rudimentary.

Brush Painting.—With reference to brush painting, it is advisable that all teachers who wish to make this occupation of the highest educational use should not confine the work to blob painting, but as far as possible encourage and aim at the free use of the brush. Should the hand of the child be very unsteady, it will be found that much may be done towards getting control by practice in making brush impressions with water on a slate.

In this scheme it is intended that Classes I. and II. use the brush, and Classes III. and IV. coloured crayons.

Drawing.—Drawing in some form would be given to all classes, and stick-laying in addition to Classes III. and IV.

Paper Cutting.—Paper cutting would be suitable for Classes I. and II., and paper folding for Classes I., II., and III.

Games.—In most cases the game has been correlated with the work for two weeks, so that the children by this arrangement will become familiar with the game, and play with more spirit than is often possible.

Details of the work set out in this scheme will appear regularly in the *Practical Teacher*. The course for September will be taken next month.

SCHOOL GARDENING FOR LITTLE CHILDREN.

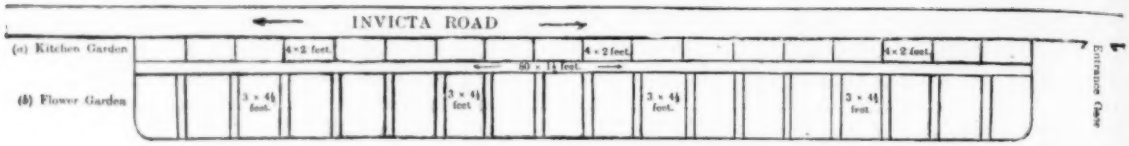
BY LUCY R. LATTER.

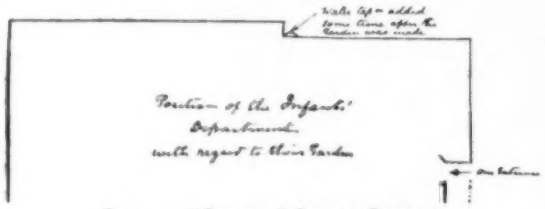
PART III.

"There ought to be gardens for all the months in the year; in which, severally, things of beauty may be then in season."

IT will, perhaps, be well now to say a few words as to how the costs of all the gardening described in my two previous articles are defrayed.

Under Article 255 of the Code of the School Board for London, I am allowed the sum of ten shillings per annum for the purchase of seeds, etc., for the cultivation of plants in school, and a similar amount for expenses in connection with our outdoor gardening. These amounts are by no means sufficient to cover all the costs incurred thereby, although we save and use seeds, etc., from our own plants from year to year, and from time to time get gifts of other seeds and plants from some of our children, their parents, and other friends. I find,





PLAN OF "INVICTA" SCHOOL GARDEN.

however, that the Board also allow, under the Article already referred to, a sum of four shillings a quarter for the purchase of material, etc., for use in object lessons, and I hope I shall in due time be allowed this sum too; it will certainly be a further help in the matter of maintaining our indoor and outdoor gardening. Suitable gardening tools for the children's use are provided by the Board. The following is a list of them:—Watering-cans, trowels, rakes, spades, hoes, and hand-forks. They may be applied for on the yearly requisition forms for school materials. The holland pinafores used in the modelling lessons will be found most useful for the little gardeners, and they may be obtained in the same way as the gardening tools.

Our garden is not in any way protected from intruders, and occasionally footprints of various sizes on the beds tell a sad tale. We think, in spite of this, however, that it is better to lead would-be mischievous people to respect our garden by leaving it free to them, and not by raising barriers against them. Our own children love the garden too well ever to do it the least harm. A *new* child may at first be tempted to pull a plant or pretty flower in a wanton manner, but he soon learns the law of the school, which consists in—

> "Controlling, not with tyrant's might,
> But, helping all things move aright,
> With gentle, guiding hand,"

and becomes as ardent a protector of the tender flowers and plants as his comrades.

Now it will be interesting to see what things were sown or planted in our garden at different seasons of the year, and how they throve. Then a list of the subjects which were under special consideration during one year will show how our garden is the source from which we draw material for our special nature study (the object lessons of the Government Code), and, therefore, more or less for all the work of the school.

It will be remembered (Article 1) that we were really only able to begin our outdoor gardening after the summer holidays of 1901, and that we confined our planting that autumn to three beds in the kitchen garden and six in the flower gardens; potatoes being set in the former, and bulbs for the most part in the latter. The settings and sowings then and later were planned somewhat thus: tall plants in the centre of the bed, plants of medium height round them, and plants growing near the ground, and forming, therefore, a suitable border, round the whole edge of the bed. This arrangement is indicated in the following lists by the terms *centre*, *round centre*, *border*. The more special arrangement of the plants was left to the fancy of the little gardeners. The tall centre plants were sometimes arranged in the form of a ring, sometimes in that of a cross, whilst those of medium height around were arranged in semicircles, or scattered here and there between the plants of the centre and the border. The figures opposite the names of the bulbs in the following lists indicate the number of bulbs, etc., set in the particular bed. The beds are numbered from right to left of the spectator, and, as the accompanying plan shows, from the end of the garden near the entrance gate of our playground.

Bulbs, etc., planted in our Flower Garden, November 1901.

BED 2.

Centre . . . Daffodils, 7.
Round Centre Hyacinths, 8.
Border . . Mixed crocuses, 40.

BED 5.

Centre . . . German iris.
Round Centre Winter aconite, 18.
Border . . . Purple crocuses, 50.

BED 8.

Centre . . . Japanese anemones.
Round Centre Pheasant eye narcissi, 8.
Border . . Mixed crocuses, 50.

BED 11.

Centre . . . Scarlet lilies, 4.
Round Centre White and red tulips, 12.
Border . . Snowdrops, 50.

BED 14.

Centre . . . German iris.
Round Centre Pheasant eye narcissi, 8.
Border . . Winter aconite, 50.

BED 17.

Centre . . . White or Madonna lilies, 3.
Round Centre Yellow narcissi, 8.
Border . . Blue squills, 50.

List of Seeds, etc., set in our Flower Garden, March 1902.

BED 1.

Centre . . . Lilies of the valley.
Round Centre Tall sunflowers.
Border . . Blue flax.

BED 3.

Centre . . . Poppies.
Round Centre Cornflowers.
Border . . London pride.

BED 4.

Centre . . . Lilies of the valley.
Round Centre Ten-week stocks.
Border . . Mignonette.

BED 6.

Centre . . . Sweet peas.
Round Centre Clarkia.
Border . . Lupines.

BED 7.

Centre . . . Eschscholtzia.
Round Centre Convolvulus minor.
Border . . Forget-me-nots.

BED 9.

Centre . . . Tall sunflowers.
Round Centre Phlox.
Border . . Red flax.

BED 10.

Centre . . . Convolvulus major.
Round Centre Larkspur.
Border . . Ten-week stocks.

BED 12.

Centre . . . Dwarf sunflowers.
Round Centre White peas.
Border . . Forget-me-nots.

BED 13.

Centre . . . Maize.
Round Centre Helichrysum.
Border . . Blue flax.

BED 15.

Centre . . . Poppies.
Round Centre Larkspur.
Border . . Mignonette.

BED 16.

Centre . . . Lilies of the valley.
Round Centre Tall sunflowers.
Border . . Forget-me-nots.

BED 18.

Centre . . . Sweet peas.
Round Centre Dwarf garden nasturtium (*Tropæolum minus*).
Border . . Primroses and polyanthus.

Seeds, etc., set in our Kitchen Garden, March 1902.

BED 1.—Spring onions.
BED 2.—Cabbages.
BED 3.—Carrots (short horn).
BED 4.—Potatoes.
BED 5.—Broccoli.
BED 6.—Potatoes.
BED 7.—Lettuces and parsley.
BED 8.—Radishes (round).
BED 9.—Scarlet runners, dwarf lettuces.
BED 10.—White runners, long carrots.
BED 11.—Broad beans.
BED 12.—Potatoes.
BED 13.—Spinach.
BED 14.—Dwarf peas.
BED 15.—Tall peas.
BED 16.—Scarlet runners.
BED 17.—"Painted ladies" (red and white runners).
BED 18.—Scarlet runners.

During the ensuing months various other things were set in our garden: for instance, cuttings of ivy, lilac, and Cape jessamine were planted against the fence in some of the back beds, and chrysanthemums, dahlias, and London pride in some of the front ones.

With the exception of the forget-me-nots, poppies, helichrysum, and peas, all the seeds, etc., set according to the foregoing lists yielded good and abundant results. The soil was not moist enough for the forget-me-nots, and the cornflowers were too prolific for the welfare of the poppies in one bed, whilst the sparrows made rather short work of the peas as soon as the tender little shoots appeared.

Nearly all the things planted in our garden were annuals, so it may be well to give a list of the seeds, etc., set the following spring (1903). The rotation of crops was very carefully considered in making out this second list. We left all the bulbs in the ground, but added to their number and variety in the autumn (1902).

New Bulbs added November 1902 to the Bulbous Beds already described.

BED 2.—Hyacinths, 6.
Daffodils, 6.
BED 5.—Gladioli, 9.
BED 11.—Tulips, 6.
BED 11.—Snowdrops, 50.
BED 14.—Gladioli, 6.
Narcissi, 8.
BED 17.—Spanish iris, 50.

List of Seeds, etc., set in our Flower Garden, March and April 1903.

BED 1.
Centre . . Lilies of the valley—perennial—of last year.
Round Centre Yellow lilies.
Border (or near it) Foxglove, Canterbury bells, lemon thyme.

BED 3.
Centre . . Sweet sultan.
Round Centre Godetia.
Border . . Candy tuft.

BED 4.
Centre . . Tall sunflowers.
Round Centre Red flax, and
(Border) . . Ten-week stocks between.

BED 6.
Centre . . Poppies.
Round Centre Mignonette.
Border . . Nemophila.

BED 7.
Centre . . Sweet scabious.
Round Centre Canterbury bells.
Border . . Phlox.

BED 9.
Centre . . Sweet peas.
Round Centre Coreopsis.
Border . . Mignonette.

BED 10.
Centre . . Dwarf sunflowers.
Round Centre Lupines.
Border . . Sweet alyssum & red flax between.

BED 12.
Centre . . *Clarkia.
Round Centre Convolvulus minor.
Border . . *Mignonette.

BED 13.
Centre . . *Eschscholtzia.
Round Centre *Eschscholtzia.
Border . . *Blue flax.

BED 15.
Centre . . *Poppies.
Round Centre *Larkspur.
Border . . Dwarf garden nasturtium (*Tropæolum minus*).

BED 16.
Centre . . Lilies of the valley—perennial—of last year.
Round Centre Clarkia.
Border . . *Blue flax.

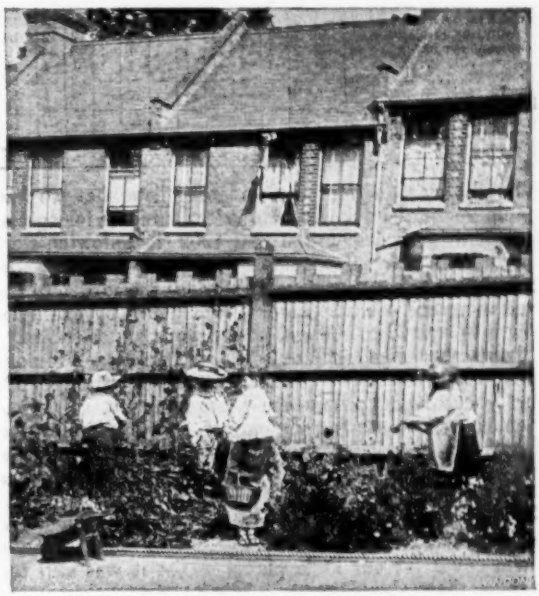
BED 18.
Centre . . Eschscholtzia.
Round Centre Eschscholtzia.
Border . . Primroses—perennial—of last year.

*Seeds saved from our plants of last year.

Seeds, etc., set in our Kitchen Garden, March 1903.

BED 1.—Cabbages.
BED 2.—Potatoes.
BED 3.—Scarlet runners.
BED 4.—Radishes (round).
BED 5.—Painted ladies (red and white runners).
BED 6.—Broad beans.
BED 7.—Carrots (short horn).
BED 8.—Potatoes.
BED 9.—Peas.
BED 10.—Onions.
BED 11.—Long carrots.
BED 12.—Cabbage lettuces.
BED 13.—Scarlet runners. Radishes (long).
BED 14.—Carrots (short horn). Sweet lavender.
BED 15.—Cos lettuces.
BED 16.—Carrots.
BED 17.—Shallots.
BED 18.—Scarlet runners. Radishes (round).

We had a fine show of bulbous flowers again in the spring. The weather was, however, not very favourable to our garden during the succeeding summer and autumn; so the seeds, etc., set in the spring did not yield such rich flowers as those of the previous year.



SUMMER-TIME IN OUR GARDEN.
"What if earth be but the shadow of heaven!"

The sweet alyssum, nevertheless, yielded a profusion of dainty little flowers, emitting a most delicate and sweet perfume, and the nemophila charmed us with its masses of lovely little blue eyes. The chrysanthemums made a splendid show all the autumn through, and so did the garden nasturtium or *tropæolum*.

As it is advisable to take up bulbs after one, two, or three years, as the case may be, we decided to plant five new bulb beds in the autumn, and to free the original bulb beds of the plants in them, as they finish flowering this year. These beds will then be dug up by the children, who enjoy this work most thoroughly, and, later, experience the still greater pleasure of setting seeds, etc., in them.

The following is a list of the

New Bulbs, etc., set in our Flower Garden, in five beds freed from expended Annuals last November (1903).

BED 4.
Centre . . Lilies of the valley—perennial.
Round Centre Spanish iris, 30.
Border . . Mixed crocuses, 50.

BED 7.
Centre . . Daffodils, 12.
Round Centre Spanish iris, 20.
Border . . Snowdrops, 100.

Bed 10.

Centre . . The school lily (*Lilium candidum* — white or Madonna lily), 1.
Round Centre Italian hyacinths, 12.
Centre . . Mixed hyacinths, 12.
Border . . Winter aconite, 100.

Bed 13.

Centre . . Polyanthus narcissus, 7.
Round Centre Early tulips, 14.
Border . . Scilla (*Campanulata rosa*), 50.

Bed 16.

Centre . . Pheasant eye narcissi, 15.
Round Centre Late tulips, 24.
Border . . Lent lilies, 12.

New Bulbs, etc., set in School by the children of the various classes for the Hall as well as for their own Classrooms, November 1903.

	Class 1.		Class 2.		Class 3.		Class 4.		Class 5.		P.T.'s.		Total.
	Hall.	Class-room.	Hall.	Class-room.	Hall.	Class-room.	Hall.	Class-room.	Hall.	Class-room.	Hall.	Class-room.	
Daffodils	4	4	4	4	4	4	4	4	4	4	5	5	50
Lent lilies	3	—	2	1	2	—	2	2	—	1	—	—	13
Polyanthus narcissus	1	1	1	1	2	2	1	1	1	1	2	2	16
Pheasant eye narcissus	1	—	1	1	1	1	1	1	1	1	—	—	9
Tulips	1	1	1	1	1	1	1	1	1	1	1	1	12
Crocuses	3	—	3	—	4	—	3	—	—	—	2	—	15
Snowdrops	—	—	—	3	—	—	—	3	6	—	3	4	19
Winter aconite	—	—	—	—	6	6	—	—	—	—	—	—	12
Hyacinths (in water)	4	2	—	2	—	1	—	2	—	1	—	—	12
Hyacinths (in earth)	—	1	—	1	2	2	—	1	—	1	—	—	8
	17	9	12	14	22	17	12	15	13	10	13	12	166

It will be seen from the foregoing lists that we had ample material from which to select subjects for special consideration. During the year 1902 the following were selected. A careful consideration of them will show the relation of the more general work of the garden to the special nature study. Later I will show, by example, how it is related to the rest of the work of the school.

JANUARY. *The sparrows in our garden.*—Previous experience had taught us that these little visitors spoilt our crocuses and peas when they came up, so it was deemed well to study the sparrow a little closely, and to try to know something of its habits, etc., and how we could entice and keep it away from our garden in the early spring.

FEBRUARY. *Water. Some forms of water—snow and ice, or rain, according to weather.*—The snow made a warm cover for our little plants whilst it was still too cold for them above ground. The ice caused the ground to break up so that the air could pass through and sweeten it. The rain helped the plants to grow. It quenched their thirst on hot days; it washed the dust from off their leaves; and on days when no rain came the children watered the plants with water from the playground tap.

MARCH. *The snowdrop.*—

> "The frail snowdrop,
> Born of the breath of winter, and on his brow
> Fixed like a pale and solitary star,"

was the first flower to appear in our garden, the first floral herald sent to announce the approach of spring.

APRIL. *Seeds in connection with the life of the bean. The germination of the bean, the pea, maize, wheat, etc.*—Beans, peas, maize, wheat, etc., were set to grow in water, on flannel, on sponges, on sand, and in earth, so that the children could actually observe from day to day what happened in the very early stages of the life of some of the many seeds set in their school garden.

MAY. *The earthworm.*—In digging, etc., in the garden, the children came across many worms. Nothing was, therefore, more natural than to endeavour to know something of the life and habits of these marvellous little creatures, especially as the welfare of the garden depended so much upon them.

JUNE. *The radish.*—The radishes in our garden had reached the stage when they were ready for eating; and as they were the first vegetable produce of our garden, they naturally received very special consideration. A "grand feast" of radishes, shared by many of the children's parents and some friends, formed a happy climax to this month's work. In "pulling" the radishes, care was taken to leave some in the ground to continue and complete their work.

JULY. *The broad bean.*—By this time the broad beans were ready in our garden. They had been saved with great difficulty from the depredations of the black-fly, a well-known enemy to broad beans. The broad bean had, therefore, a special interest for us. Its growth had been daily watched by the children, and I remember, on one occasion, when walking down in front of the beds of the broad beans, how my attention was called to the number of "butterflies" which the children thought had pitched upon their bean plants. The "butterflies" were soon found to be the flowers of the bean.

AUGUST. *The radish flower and pod.*—The radishes left in the ground in June were now completing their work, and as the flowers and pods appeared, the children were able to read the further story of the little seeds they had planted in the spring. Sprays of the plant in this stage were pressed and mounted; and whilst some of the seed pods were allowed to mature for the sake of the seed, which was then collected and kept for use during the following spring, pods in the green state were pickled and stored away for later use.

SEPTEMBER. *The runner beans in our garden.*—The scarlet runners and "painted ladies" were now ready to reveal their secrets to us, and some of the fruit found its way to a few of our friends, who fully appreciated the freshly-gathered and therefore tender vegetable.

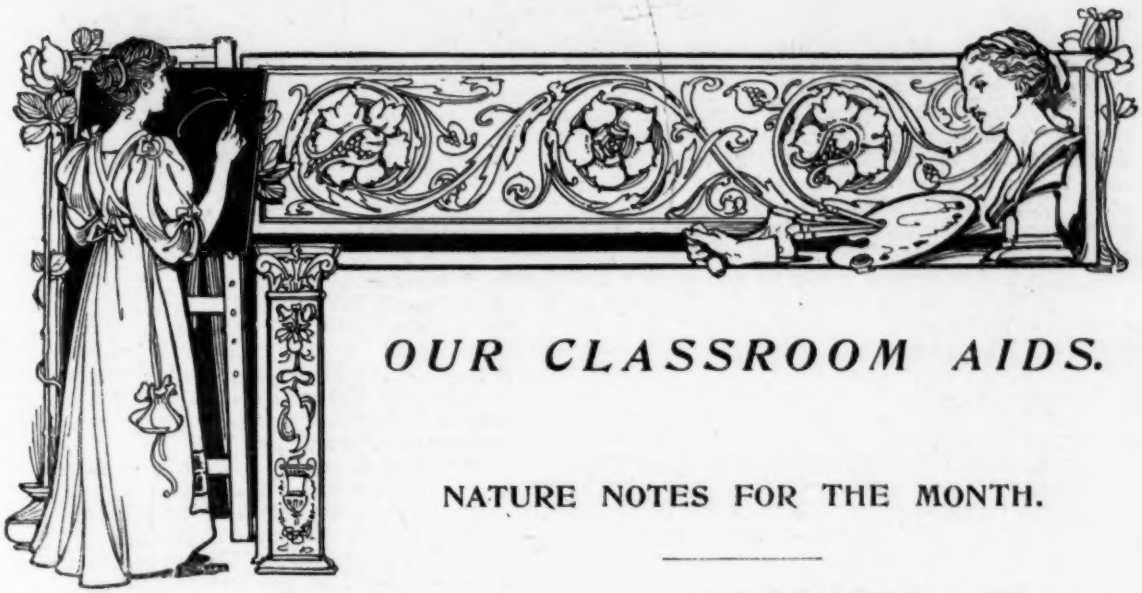
OCTOBER. *Nature's treasures and treasure boxes.*—This was the harvest time, and many a happy hour was spent in the ingathering of the ripe countless treasure boxes from our garden, and in the examining, separating, sorting, and packing away of their dainty contents for use during the following spring.

> "There is no death! what seems so is transition."

NOVEMBER. *Bulbs—the solid bulb, or corm, in particular.*—Many bulbous plants had been before our eyes during the spring, and as we wanted to add to the number and variety of those already in our garden, it was quite time to get the unplanted bulbs put away in their cosy beds. It seemed fitting, therefore, that we should consider some of these bulbs more specifically. As the crocus was to form the subject of special consideration the following March, most attention was directed to the solid bulb, or corm, crocuses and gladioli being set to grow in school as well as in the garden.

DECEMBER. *Christmas.*—All the year, in their intimate relationship with the marvellous things of Nature, the children had been gradually and quietly awakening to the fact of the great love and the wonderful wisdom of the divine Planner who "paints the wayside flower and lights the evening star." At this season we tried to help our children to realise that great love and wonderful wisdom as expressed in the gift to the world of the Christ Child. In commemoration of this glad event the rooms were decorated with ivy and other evergreens brought by the children from their homes, as the ivy and evergreens in our school garden had only just begun to grow.

(*To be continued.*)



OUR CLASSROOM AIDS.

NATURE NOTES FOR THE MONTH.

"The Slaughter of the Innocents."

DOWN in the meadows there is great excitement amongst the tiny folk inhabiting the thyme-covered ant mounds which rise with such frequency above the general level of the surrounding pasture. All the available population of the numerous little townships have gathered together on their respective hillocks to witness the departure of a venturesome band of pioneers, who are about to set out into the wide world with the laudable object of founding fresh colonies.

The would-be colonists are perhaps rather young to undertake such an arduous mission, for they have only reached their majority during the last few days, and "a coming of age" in the ant world merely implies that the recipient of the honour has reached the mature age of five months. However, Nature has done her best for them; for all of these favoured mortals, in contrast to their stay-at-home brethren, are provided with four gauzy but serviceable wings, as a means of transport.

Viewed from the ants' standpoint, fully one-half of the emigrants are of royal blood—princesses or virgin queens, each of whom, should the fates be propitious, will ultimately be at the head of a thriving little community of her own founding. The remainder of the band are males. They will have no hand in the actual building of the new cities; nevertheless the expedition would be a complete failure without their distinguished presence, for they are accompanying the queens in the capacity of prospective consorts, the marriage ceremonies to take place *en route*.

Not one of these gay bachelors will ever have the pleasure of seeing his future offspring, and probably very few will set foot on their birthplace again; but in the exuberance of youth a mere detail of this kind does not deter them from setting out on what, to them, is purely a honeymoon trip.

Every little hillock in the sun-baked field is now sending forth its winged detachment to join the swarms who have already begun the journey. Luckless mortals, they pay dearly for their temerity in leaving the old home. Perhaps the newly-fledged members of royalty have a pleasant flavour, distinct from that of their humbler brethren. No sooner is the first batch on the wing, than all the insectivorous birds of the neighbourhood, apprised of the fact in some mysterious fashion, flock into the favoured area to give their highnesses a royal reception. Were it not for this circumstance, the flight of these minute creatures might possibly escape the notice of all but the observant naturalist. As matters now stand, the behaviour of the birds is certain to attract the attention of even the most diffident.

The starling, in particular, makes himself conspicuous by the clever manner in which he temporarily assumes the rôle of the spotted flycatcher, a nimble little gray bird who, as the name implies, is a master-hand in the art of flycatching. As a rule, the starling is content to earn his living by delving, in company with acquaintances, amongst the grass roots in search of the destructive larvæ of the "daddy-long-legs," or crane fly.

At the first indication of the ant swarms the little party quit their laborious task and scatter themselves amongst the tops of the neighbouring trees, there to await patiently the coming of the insect host.

Warmed by the bright rays of the afternoon sun, the careless ants mount higher and higher, in blissful ignorance of their coming fate, and gradually the outlying stragglers drift imperceptibly towards the fringing trees wherein their watchful enemies are concealed.

With eager flight one of the birds launches itself diagonally upwards. To our poor eyesight the quarry is invisible; but judging from the energy with which the bird twists and turns in the air, it is something tangible and worth striving after, and, moreover, is making strenuous efforts to escape its relentless pursuer. Suddenly the starling stops in his erratic course, and returns to his perch with a leisurely flight, plainly betokening a self-satisfaction which augurs ill for some unfortunate ant. Throughout the whole of the summer afternoon the same scene is enacted again and again, sometimes simultaneously by half a dozen birds, and each time it occurs the observer may rest assured that another ant has met with an untimely end.

The remnant that has the good fortune to escape must not congratulate itself too soon, for there are other ordeals yet to come. In their irresponsible flight, large numbers of the ant colonists blunder into the meshes of cunningly-placed spiders' webs, and the

builders thereof naturally proceed to make the most of their golden opportunity.

Down by the riverside the unlucky ants are in more trouble. Their honeymoon over, the harassed creatures sink once more towards kindly mother earth. Some reach their desired haven, but many find a resting-place on the surface of the hitherto unruffled stream. The patient angler, complacently eyeing the ever-widening rings, remarks that the "fish are rising to fly," and straightway, after examining the fly and making the necessary change in his tackle, he skilfully casts a cunning imitation amongst the struggling victims, in the hope that the feathered fraud may be taken with the genuine article.

Of the survivors, the males, who have finished their duties and are therefore of no consequence, wander about, and ultimately die. With the fertilised female the case is different, for with her rests the responsibility of founding the new colony. On finding a suitable crevice, she crawls in, snaps off her now useless wings, and rests awhile. During the next summer a populous little city rises on this site.

Domestic Life of the Yellow Ant.

In order to understand the origin of this wonderful flight, it is necessary to go back to the previous spring, and trace the events which have been taking place in one of the established hillocks.

The insect in question is *Formica flava*, the yellow field ant, or "emmet," as it is popularly termed. As the interior of the hillock is difficult of observation, we will see what happened in an observatory nest exhibited in 1902 at a well-known East End museum.

The little colony, taken in April, was housed between two sheets of glass, arranged in a horizontal plane, at such a distance from each other as to allow a space of one-sixth of an inch. The latter condition precluded any possibility of the inhabitants throwing up earth-works, and so hiding their domestic operations. To compensate for the want of privacy, the artificial nest was provided with a light proof cover, removable at pleasure. The nest, when taken, contained a queen, workers, eggs, and larvæ. Unfortunately the head of the establishment, the queen, died; but a description of this important personage will not come amiss. She was twice as long as the average worker, and wingless, and her colour approximated more closely to a blackish brown, save on the under part of the abdomen, where it was paler. Her sole duty is to lay eggs (the fertilisation previously mentioned suffices for a lifetime); and in order that she may do this to the best of her ability, all the menial work attendant on rearing the larvæ is undertaken by the yellow workers. The eggs are laid throughout the whole of the spring and summer months. No sooner are they deposited than they are taken under the care of the waiting nurses, who hurry off to store their precious burdens in the snuggest corner of the nest, where in a short space of time they bring forth the larvæ.

To resume the narrative of the captive ant. The grubs bore a great resemblance to the larvæ of the common house-fly. They had the same annular or ringed structure, and their bodies tapered to a point at the fore end; but here the resemblance ended, for whereas the familiar maggot knows how to take care of itself, these helpless little mortals were absolutely dependent on the good will of the workers. When impelled by the cravings of hunger, the babies turned their heads, and made known their wants by the simple expedient of opening their mouths. The attendant nurses thereupon ran up to their charges and disgorged the necessary food. Both young and workers throve well on a diet of honey, which was placed for their benefit in two little troughs outside the nest.

Of course in a state of freedom they would have had a wider variety of foods to choose from. The familiar aphis, which infests the young shoots of the garden plants, exercises an attraction for the wild ant, not in any sinister sense, but because it is constantly exuding a sweet juice extracted from the plant. The organs which secrete the fluid are plainly visible under a low-power glass as two horn-like projections at the rear of the abdomen. The ant does not wait the pleasure of the aphis, but extracts the nectar by a process which has been compared to milking.

The workers took every possible care of the grubs, which grew rapidly under their generous treatment, and throughout the day the honey troughs were constantly being visited. The method in which the young were arranged was interesting. They were not scattered broadcast over the nest, but methodically sorted out according to size, and arranged in little groups comprising some dozen or more individuals of the same size.

The only explanation of this curious fact is that the arrangement facilitated the process of feeding. It is well known that both ants and bees rear their young queens on a special diet distinct from that supplied to the plebeians, and in this case it is plain that a worker laden with queen food could more easily distribute its bounty if all the young females were gathered into exclusive groups. This supposition was actually confirmed, for the groups of larger larvæ did ultimately produce queens. We have a parallel in the classroom—all the children capable of assimilating certain knowledge being gathered together into one group, so as to make the teacher's task easier.

The workers were continually changing the position of the groups. In a state of nature the young are carried up by day into the higher chambers, in order that they may have the benefit of the sun's heat; so perhaps the industrious nurses were trying to follow out their natural instinct.

One thing, however, invariably caused them to shift the larvæ. No sooner was half the nest illuminated by a partial removal of the cover, than the workers picked up the young in their mandibles, and hurried across to rearrange them under the darkened half. By moving the cover backwards and forwards the poor ants could be made to repeat the process until further orders.

They were careful, too, in the matter of ventilation. With the laudable object of providing them with a little fresh air, two openings were cut in the wooden frame holding the glass in position. The rascals thereupon showed their disapproval of the draught by neatly blocking up the apertures with a supply of mould.

During the last week in June (unfortunately I have no dates of these events) the larvæ began to enter the pupal stage. The pupæ were of two sizes—the larger nearly a quarter of an inch in length, the smaller half the size. The pupæ are doubtless familiar to all as the ants' *eggs* (notice the italics) with which the aquarium keeper is wont to regale his goldfish. Externally they are oval, yellowish-white bodies, with one end tipped with black. The part which meets the eye and gives the distinctive shape is a tough cocoon or protecting shell,

spun by the grub previous to its transformation; the living creature is inside. It has cast its larval coat, and is now wrapped up in a second skin, which fits so tightly as to allow the complete outline of the perfect insect to be discerned. Many of the other species of British ants do not spin the cocoon, but simply enter the pupal stage by throwing off the larval skin. When it is ready to emerge, the workers, who can tell by the sense of hearing when to begin, set to work on the end opposite to that tipped with black, and bite through the outer cocoon, and liberate the perfect insect from the second skin.

The young ants emerged in the latter end of July. The larger pupæ produced queens or females, the smaller ones males, but of workers I saw no sign. The latter may have mingled with the old workers, and so escaped observation. However, the identity of the queens and males was unmistakable, for they were totally unlike the ordinary working ant. They were of a different colour, the males being black, and from their shoulders there sprang four filmy wings.

As in the case of most of the representatives of the lower orders of life, where the female has the harder share of life's battle, the young queens were decidedly the superior insects, being more than twice the size of their male relatives. After the release of these gorgeous creatures, the old cocoons, formerly such objects of veneration to the workers, were unceremoniously bundled into the remotest corners at the edge of the nest, where they lingered for a few days, and finally disappeared.

Both queens and males remained in the precincts of the nest for several days, each one surrounded by admiring workers. Occasionally they went outside in a body to take an airing, still accompanied by the workers. They never visited the food supply, but it was significant that a great number of their old nurses still continued their pilgrimages to the honey trough. One fine day in August a visit to the nest disclosed the fact that all the gay throng had disappeared—flown away undoubtedly; for with the exception of a few who had had the misfortune to fall into the surrounding moat, not a single individual was visible. Whether or not they succeeded in colonising the neighbouring gardens of Stepney I do not know, but I am afraid the sparrows could enlighten us on the subject.

In giving a lesson on these interesting little insects, it is well to compare their life history with that of the butterfly, for the four stages—the egg, the larva, the pupa, and the imago—are precisely similar.

NOTES OF LESSONS ON THE SEASHORE.

Class.—These lessons are suitable for the upper standards of any school, particularly those in which the children are not systematically trained to study nature.

Time.—Some time should be devoted before the holidays to pointing out some of the objects that may be found on the seashore, and to arousing a desire in the children to find these things for themselves should they visit the seaside. When the children return, laden, let us hope, with their spoils, and with their minds broadened by their experience, the teacher must gather up the materials that are most abundant, and utilise them for one or more lessons, as we have done in the case of the anemones.

Object.—To provide instructive recreation for the holidays, and then to formulate the ideas gained by the observation of the children.

Step I. Preparation.—The following are a few points to one or more of which the children could direct their attention:—

1. *The Weather, etc.*—If each child enters in a note-book, day by day, the direction of the wind and the kind of weather during the day, the influence of prevailing winds on climate will be brought home in a practical manner. Similarly, if the time of high water is entered, and also the time of the moon's southing (the former is posted at most seaside places, and the latter can be obtained from an almanac), these times could be plotted on squared paper after returning to school, and curves traced which will show the connection between tides and the moon.

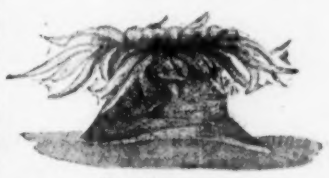
2. *Marine Erosion.*—Note should be taken of any signs of marine erosion, such as crumbling or falling cliffs, submerged forests, etc.

3. *Shells.*—These form valuable collections. Some would be gathered for their beauty, some on account of the habits of the creatures that inhabit them, such as the limpet, which clings so tenaciously to the rock; or the cockle and the razor-shell, which burrow in the sand. Others, again, are interesting from other points of view, like the cowry, which for a long time supplied the tribes of Western Africa with a medium of exchange; or the murex or purple-shell, which furnished the ancients with the famous purple dye.

4. *Seaweeds.*—These always attract the collector on account of their beauty, but several varieties are put to practical use, such as dulse, laver, and carrageen moss, which are eaten. In some parts the seaweed is gathered for fuel and manure, and at one time burnt seaweed supplied almost all the soda-salts used by the glass manufacturer; but these can now be obtained more cheaply in other ways. Those who contemplate keeping a marine aquarium will find the common green laver useful for oxidising the water.

5. *Marine Animals.*—The pools among the rocks afford never-ending amusement to the children in watching the swarms of small marine animals that disport themselves, and in noting their forms and habits, and also the marvellous power of mimicry by which nature enables them in some measure to escape their enemies.

6. *Sea Anemones.*—These are perhaps the most beautiful and interesting objects to be found on the seashore. Sometimes a clear pool may be found containing dozens of them fully extended, so that the collector has no difficulty in recognising them; if not, he can generally find, after the tide has receded, several small lumps of what appears to be red or green jelly adhering to the rocks. These also are anemones. Select a good-sized specimen and detach it from the rock. This can be done by passing a thin knife beneath the base; but it must be done very carefully, for the anemone clings tightly to the rock, and is easily injured. The best way of obtaining a good specimen is to break off the piece of rock to which it is attached, with a smart blow from a hammer.



SEA ANEMONE.

Step II. Presentation.—(This and subsequent steps are confined to the sea anemones.) If these jelly-like objects are placed in an aquarium, they will open out into lovely flower-like objects similar to those in the pools. Each consists of a comparatively thick upright stem, on the top of which is an opening, and arranged around this opening are a number of beautifully-tinted tentacles giving the anemone its flower-like appearance. So strong is this resemblance that at one time anemones were supposed to be flowers growing from the rock, and scientific men still classify them under a title which means "living flowers." If we leave our specimen in the aquarium for a short time, we shall probably find it indulge in the unflower-like conduct of detaching itself from the stone and crawling up the side of the aquarium like a snail or slug; for it belongs to the animal and not to the vegetable kingdom.

The Parts of an Anemone.—Externally the parts of an anemone are (1) the base or foot; (2) the fleshy, cylindrical body; (3) the mouth, surrounded by rings of tentacles. When the anemone is fully expanded, beautiful little blue knobs are seen around the edge of the mouth among the tentacles. These are about the size of small shot, and of a lovely turquoise blue, so that the anemone seems to be crowned with a diadem of precious gems.

The Use of the Parts. 1. *The Foot.*—This serves the double purpose of an anchor and a means of locomotion. When the anemone wishes to remain at rest, it fastens itself to the rock by means of its base, in exactly the same way that a boy fixes his leather "sucker" to a stone; in both cases the air is driven out, and the pressure of the atmosphere serves to keep the object in its place. When the anemone crawls, it pushes forward one side of its base, fixes that firmly, and then draws the other side after it.

2. *The Body.*—This consists of little else beside the stomach. Take an inverted paper bag (Fig. 1) and

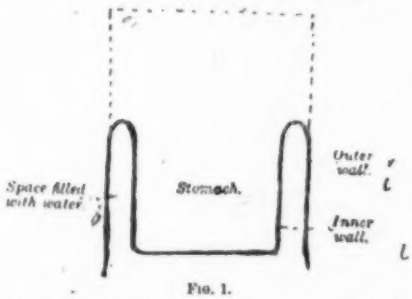


Fig. 1.

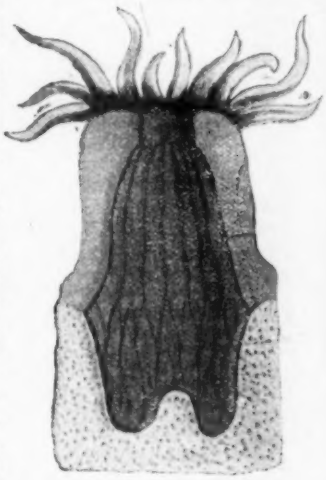
push it in until half the bag has been tucked in. This gives a good idea of the structure of the body of the anemone, which consists of an outer and an inner wall, with a space between filled with water. The inner wall forms a sac or bag which is the stomach of the animal. The two walls are connected by thin membranes.

3. *The Mouth and Tentacles.*—The tentacles communicate with the space between the two walls, and the anemone extends them by contracting this space, and so forcing water from it into the tentacles. If a piece of meat is dropped among the tentacles, they instantly seize it and push it through the mouth into the stomach. Here they hold it until all the digestible parts have been absorbed, after which they withdraw the parts that cannot be digested, and cast them away. In spite of its delicate, fairy-like appearance, the anemone has a most voracious appetite, and will seize animals almost as large as itself, and in spite of their struggles hold them quite firmly until they are dead.

How the Anemone holds its Prey.—The microscope shows us that the anemone does not hold its victim in its tentacles in the same way that a man holds anything in his fingers. All over the anemone, and particularly over the tentacles, are a number of minute capsules, too small to be seen by the naked eye, but clearly visible under the microscope. Each of these capsules contains a fine thread coiled up in it, and when the animal is excited these threads dart out of their hiding-places like tiny harpoons, so that the victim is not simply clasped by the tentacles, but also pierced and held down by hundreds of these tiny threads.

Relatives of the Anemone.—There are two objects closely allied to the anemone which will repay the trouble of finding and collecting. These are the common madrepore, and the finger-shaped alcyonium, or "dead man's finger" as it is popularly called.

The common madrepore is very similar to the anemone, but more stability is given to its structure by a number of chalky plates which radiate from the centre. When the anemone dies, its body soon decomposes, and entirely disappears; but when the madrepore dies, the chalky plates remain behind as a lasting memorial. These may be found lying among the rocks, and are sometimes mistaken for petrified mushrooms, for they very much resemble the under side of a mushroom.



Coral Polyp.

The finger-shaped alcyonium furnishes us with another interesting type. When examined under a good lens, the alcyonium appears to be covered with a number of tiny buds. These, however, are not really buds; for each one is a complete structure, almost identical with the anemone, but much smaller, and is known as a polyp. These polyps form an ideal commonwealth, in which each member works for the common good; for the nutriment gathered by each polyp benefits not that individual polyp, but the whole animal.

Step III. Association.—Familiarity with the nature and structure of these objects found on our own shores will enable the children to form correct ideas of those similar forms of life that build up the coral reefs of the Pacific and other oceans. There are probably few things about which so many erroneous ideas exist as about coral. The old-fashioned idea that it was of vegetable origin having been put aside, the coral reef is now often described by popular writers as being "built up by coral insects."

> "Ye build! ye build! but ye enter not in,
> Like the tribes whom the desert devoured in their sin;
> From the land of promise ye fade and die,
> Ere its verdure gleams on your wearied eye."

Such is the description given by one popular writer, while another speaks of the coral as working

"With simplest skill and toil unweariable."

The coral is a much lower form of life than the insects, being, in fact, similar to the madrepore. Just as the madrepore forms chalky plates which remain after the animal's death, so the coral secretes carbonate of lime from the sea-water, forming somewhat similar plates, and also a hard, stony base or foot. This is, of course, a natural growth, and does not require "toil unweariable" on the part of the coral. The coral polyps, as a rule, live in communities like the alcyonium; and as the polyps die the stony parts remain, as in the madrepore, and help to form the coral reef.

Step IV. Formulation.—1. The sea-anemones, in spite of their flower-like appearance, belong to the animal kingdom.

2. The anemone consists of—

(1) A base or foot.

(2) A body.

(3) Rows of tentacles surrounding the mouth.

3. The base acts as an anchor to hold it securely in one place, or as a foot to travel with.

The body resembles a double bag—the space between the two walls is filled with water, and the inner space forms the stomach.

The tentacles seize the prey and push it down into the stomach. The tentacles are covered with hundreds of tiny threads, which pierce the victim and hold it firmly.

4. Closely allied to the anemones are the madrepores, which secrete carbonate of lime; and the alcyoniums, which show how a number of polyps live together and form one community.

5. The coral resembles—

(*a*) The anemone in structure.

(*b*) The madrepore in secreting carbonate of lime.

(*c*) The alcyonium in living in colonies.

Step V. Application.—Instead of aimlessly wandering about the shore, picking up first one thing and then another, merely to cast away again, the children will endeavour to make collections of common objects of the seashore, which will be both beautiful and instructive.

OUR ILLUSTRATED GEOGRAPHICAL NOTEBOOK.

JAMAICA.

JAMAICA, discovered by Columbus in 1494, was added to the Spanish possessions fifteen years later. The inhabitants were Indians of a particularly peaceable temperament, differing greatly from the more warlike Caribs, who occupied some of the adjacent islands. The island suffered untold horrors during its occupation by the Spaniards. "Hundreds died of starvation; thousands committed suicide. They hanged, stabbed, drowned, and poisoned themselves; mothers destroyed their babes to save them from the misery of living. If caught in such attempts they were flogged, had boiling water or melted lead poured over them, and were otherwise tortured until death came to their relief. All these things were done in the name of Christianity, that the gains of the conquerors might be swelled."

The extermination of the natives caused the plantations of the Spanish colonists to decline for lack of labour, and then commenced the negro slave traffic, the horrors of which it is impossible to portray. The west coast of Africa was the hunting-ground of the slave-raiders, who were chiefly Portuguese; but even English freebooters trafficked in human flesh, and Drake and Hawkins carried hundreds of poor wretches across the Atlantic. "Prime Gold Coast negroes" fetched a good price, because they were more docile than some of the more northern tribes, who promptly ran away to the woods whenever they had an opportunity. The price of a slave varied according to age, build, and general healthiness. The average price of an African was about £16, or 2,400 lbs. of sugar, and a boy could readily be exchanged for a gun or a keg of spirits.

In 1655 Oliver Cromwell sent a large force to the West Indies, to make a determined attempt to break the pride of Spain. The chief result of the expedition was the capture of Jamaica, which was the first Spanish possession to pass into the hands of another people. The first British colonists were 2,000 discharged soldiers of Cromwell's Parliamentary army, together with a large number of Royalists. The demand for black slaves increased, and in the course of the eighteenth century half a million negroes were brought into the island.

English rule, with all its shortcomings, brought prosperity to Jamaica. The sugar industry, in particular, was a source of wealth. Port Royal was the centre of stirring scenes, for it was the rendezvous of British ships engaged in commerce or in the search for spoil. The buccaneers sold their plunder here, and squandered their ill-gotten gains ashore in riotous living. In 1782 the combined fleets of France and Spain planned an invasion of the island; but Rodney and Hood frustrated their design by a victory off Dominica. A few years later, Nelson was engaged in the suppression of buccaneering and smuggling between Jamaica and the United States.

In 1807 the African slave trade was prohibited, and the year 1834 was notable for the emancipation of all slaves in the British dominions. The British Government paid £20,000,000 for the redemption of the slaves, of which over £6,000,000 was paid in Jamaica alone, to free 300,000 blacks. In 1865 the freed slaves revolted, and massacred twenty-three whites. Governor Eyre sternly suppressed the rising by methods that brought down upon him considerable odium.

General Description.—The name of the island is derived from Xaymaca, meaning "land of wood and water." The total area is about 4,200 square miles, or about two-thirds the size of Yorkshire. From east to west the island is traversed by the Blue Mountains, which rise to 7,400 feet in the west. Over a hundred streams descend to the coasts, but they are unnavigable, except the *Black River*, up which small craft can ascend for twenty-five miles. The *Cobre* forms land very rapidly at its delta; the sea is three-quarters of a mile farther off than it was in 1840. The well-watered valleys are beautifully wooded, and the scenery on every hand is extremely picturesque. The coast possesses many good harbours. There are two rainy seasons—May and October. In the latter the fall is usually very heavy. Hurricanes and cyclones of exceptional severity are sometimes experienced. The West Indian hurricane is terrible, and the ruin and desolation left in its track almost defy description. The landscape is enveloped in a dismal obscurity, the heavens are rent by vivid lightning, the wind rages, and

the sea rises mountains high, and rain descends in torrents. All nature seems distracted: birds are swept from the woods into the ocean; animals are suffocated by the impetuosity of the wind; roofs of houses are carried incredible distances; walls are beaten down; immense trees are torn up by their roots; vegetation is laid flat upon the ground. After the subsidence of the storm the harbours are covered with wreckage, whole towns are utterly dismantled, the dead and the dying lie amid heaps of earth and masonry, and on every hand are evidences of a direful tragedy. Only last year Jamaica suffered from a cyclone, and the damage will affect the prosperity of the island for years.

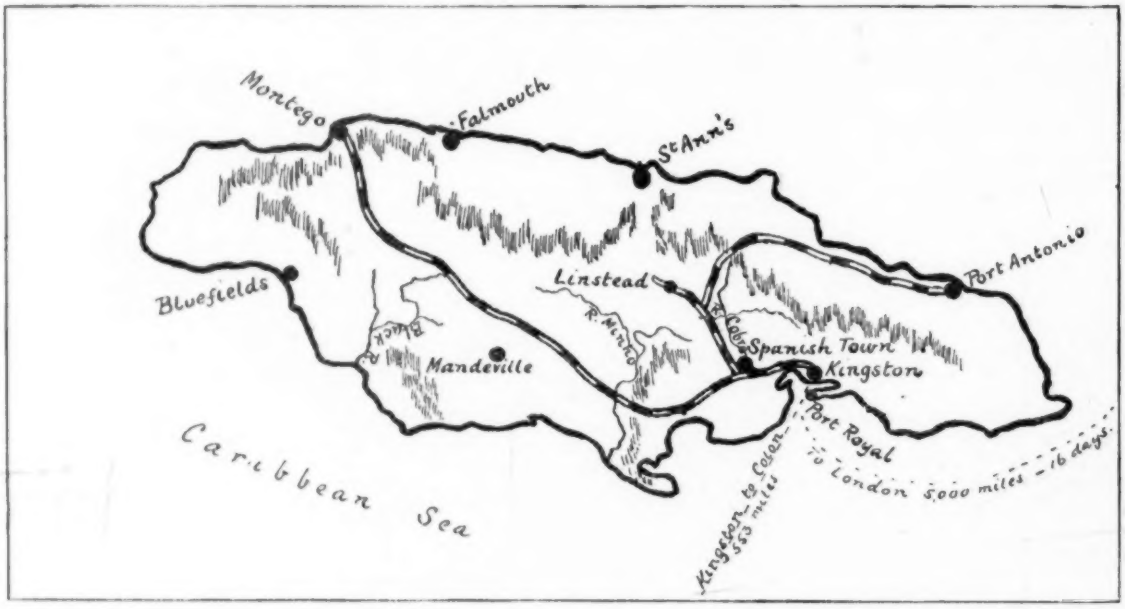
Productions and Industries.—Great inroads have been made upon the primeval forests, but there are still supplies of mahogany, ebony, and other useful woods. Fruits, both tropical and temperate varieties, flourish exceedingly. Spices, ginger, cochineal, arrowroot, maize, vanilla, pimento, sugar, coffee, cacao, succeed nearly everywhere except in the cooler uplands. Cattle-rearing is important. At one time the island, in common with other West India islands, largely depended upon the sugar industry. The competition of the bounty-fed beet product brought sugar-planters to the verge of ruin, and it became imperatively necessary to turn attention to other productions. The cultivation of fruit saved Jamaica from absolute disaster, and during the last few years the fruit trade has made astonishing progress. The establishment of a direct line of steamers between Jamaica and Bristol marks an earnest attempt to still further encourage the fruit-growers.

Bananas.—Jamaica is the centre of the West Indian banana trade. In 1900 the exports of this fruit alone amounted to £618,000, or more than half the total exports. One steamer will carry to Bristol 20,000 bunches, equal to 3,000,000 bananas, together with a mixed cargo of mangoes, pineapples, sugar, and rum. At Avonmouth special dock and railway accommodation allows the fruit to be delivered in London, Birmingham, and Manchester within a few hours after arrival.

Oranges.—The climate of Jamaica is remarkably adapted for orange cultivation. The fruit is very sweet, of rather a green colour, and ripens before other varieties are in. Owing to the length of the voyage, a market was not formerly sought in England, most of the fruit being consigned to the United States. The new steamship service, and improved methods of packing, now allow the oranges to reach this country in good condition.

Coffee.—In point of value the coffee exports rank next to bananas. The Liberian and Arabian varieties succeed in many districts, but the best prices are obtained for the famous Blue Mountain product.

Pimento is a pungent spice known also as "Jamaica pepper" and "allspice." The tree, from thirty to forty feet high, with a girth of three feet at the base, is a species of myrtle. Most of the trees are planted by birds dropping the ripe berries. The tree does not bear fruit until it is eight or ten years old, is in full bearing at eighteen or twenty, and will yield fair crops at even twice or thrice that age. The berries, about the size of a black currant, grow in clusters. Pimento takes from six to ten days to cure by the sun; all dust and leaves are fanned out, and the berries are then packed in bags for shipment. St. Ann's is the chief centre of the pimento industry.



Sugar.—The decline of the West Indian sugar trade is not wholly due to beet competition; antiquated methods of preparing the sugar are partly responsible. It is stated that 2,000 lbs. of sugar per acre are left in the canes after crushing, and from other leakages only about 55 % of sugar is actually obtained.

(To be continued.)

MODERN LANGUAGES FOR PRACTICAL USE.—Those of our readers who wish to study modern languages, not on the basis of grammar for purposes of examinations, but on the practical basis of everyday phrases for conversational use in travelling, will find Marlborough's "Self-taught" series just meet their requirements. The phrases and sentences are just those that are required in the home, street, and hotel, and for the little bit of shopping that the tourist finds it necessary to do.

OUR TUTORIAL SECTION

OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE.

BY ARTHUR T. FLUX,

Late Principal of the Belvedere Pupil Teachers' Centre, First on Scholarship List; Author of "Scholarship School Management," "Building of the British Empire," etc.

SCHOLARSHIP COURSE FOR DECEMBER 1904.
Eighth Month—August.

Work to be Prepared.

1. *Reading and Repetition.*—Steady practice is very necessary, till the candidate has performed before H.M.I.

2. *Teaching.*—The teaching of grammar and repetition—chap. viii., *Scholarship School Management.* The teaching of grammar is being omitted from the curricula of some schools, or being treated in a very desultory manner. This is a matter for regret, since the subject affords unequalled opportunities for valuable mental discipline. With what object should it be taught? Not primarily with the object of teaching children to "speak and write correctly." Although a knowledge of the subject may serve to check some few errors, it will generally be found that a child speaks and writes as he hears those around him do; his social environment is far more powerful than occasional lessons. The study of a language is a splendid exercise in syllogistic reasoning, if the subject is handled properly. Every fact arrived at can be induced from suitable examples, and except for the terminology, the child, under the guidance of the skilful teacher, can discover for himself all the laws and rules, which are too frequently taught as mere assertions. Every grammar lesson should proceed on this system:—(*a*) A collection of suitable examples should be prepared. (*b*) The exercise must be studied, (*c*) classification made, and (*d*) definition induced. To commence with a definition is entirely wrong, and takes away much of the interest. As in arithmetic, the young teacher is apt to hurry and to attempt too much, instead of proceeding very slowly and very surely. In actually teaching a class, to some extent this hurry is checked, but in writing a notes of lesson the most impossible work is set out for a lesson. In one recently examined, on the adjective, specially marked a "*First* Lesson," the heads were: "(1) Definition, (2) Kinds, (3) Comparison—Regular and Irregular, (4) Adjectives which cannot be compared"—in fact, a very good epitome of the whole grammar of the adjective, which could only be thoroughly mastered in a dozen lessons!

Repetition.—Children are taught to commit passages to memory for several reasons:—(*a*) The vocabulary is strengthened; (*b*) the style and expression of the composition are improved; (*c*) important facts may be taught; (*d*) poems frequently contain the finest ideas, expressed in most appropriate terms. In selecting a poem for the class to learn, the test of merit very frequently applied is whether it contains the exact 60 or 80 lines demanded. It frequently happens that some of the gems of our literature are found in short poems or in extracts from long poems, and these should certainly take precedence over second-rate poems which happen to be exactly the right size. Again, the number of lines prescribed is the minimum but not the maximum to be learned. Memory develops by exercise, and it is comparatively easy for a child to learn a dozen poems, and certainly far pleasanter than the wearisome reiteration of the same lines.

3. *Drawing.*—One or two copies should be drawn each week, and one occasionally sent up for correction and criticism.

4. *Music.*—Syncopation, and compass of voices.

The compass of voices is important from a practical point of view. Part-singing is frequently spoilt by children being wrongly classified. The best readers are sometimes told off to take the second or third part, irrespective of their natural voices. It must be remembered that a good or bad, high or low voice is the result of training or otherwise. The upper register should receive very careful attention, and there seems hardly any limit to its range with some boys. The average range for children under ten is—trebles **d** to **m**^{1}, altos **l**$_{1}$ to **t**; over ten—trebles **d** to **f**^{1} or **s**^{1}, altos **s**$_{1}$ to **t**. Children below ten show little difference in their range; but some can always be selected who show power and good tone in the lower notes, and they should be trained as altos.

5. *Penmanship.*—Ten minutes' practice daily. Definite rules for size and various lengths of letters must be followed always.

6. *Composition.*—Write one or two essays each week on such subjects as:—

(1.) A showery day in summer.
(2.) "Writing maketh an exact man."
(3.) The advantages of travelling.
(4.) "Fire is a good servant but a bad master."
(5.) The force of example.
(6.) "Little strokes fell great oaks."
(7.) The foreign element in the English language.
(8.) "Tongues in trees, books in the running brooks,
Sermons in stones, and good in everything."

Read up the subject if necessary. In any case think over it well, and prepare a skeleton plan before commencing to write.

Notes:—

(1.) This affords ample scope for word-painting. The changes from bright sunshine to clouds and rain and again to a clear sky should be described as vividly as possible.

(2.) This quotation must be considered in connection with its context. Bacon is pointing out the various effects of different branches of study, and by the words chosen implies that a clear and definite knowledge can only be acquired by writing down what has been learned. This can easily be proved. Every student knows that although he may think he is acquainted with a phase of history or a place in geography, very great ignorance is felt when an exact account has to be written.

(3.) Little need be said on this point; they are too obvious. Apart from the knowledge acquired and the recreative value of travelling, it is of special service to Englishmen in breaking down that insular prejudice and pride which characterise the nation.

(4.) Little difficulty will be experienced with this. Cases on both sides should be quoted and explained.

(5.) "Example is better than precept." A child told to perform a task will sometimes regard it as an impossibility; but if the teacher perform it, the child is perfectly ready and anxious to copy. So in all circumstances of life.

(6.) The truth of this proverb is expressed in many other ways which may be quoted. Instances should be given of how steady, persistent effort will produce wonderful results. Any great achievement is usually the result of years of toil. The chemist works thousands of experiments before he lights upon some startling discovery, the explorer meets with and overcomes innumerable obstacles before he is famous, and so on.

(7.) This depends upon a good knowledge of the history of the language. Note the four periods—(1) Latin of the first four centuries; (2) Latin of the monks; (3) Latin through the Norman-French; (4) Latin of the Renaissance. Point out the advantages to the language—the power of varied expression, and strength.

(8.) Everything in nature has a lesson to teach to those who will but listen, and it should not be difficult to amplify Jaques's statement.

7. *English.*—(*a*) Twenty-five roots and meanings per week.
(*b*) *Much Ado about Nothing.* Finish Act IV., Scene i.
(*c*) The essay on Studies.
(*d*) The seventeenth-century literature and the Lake Poets.
(*e*) The grammar and syntax of the preposition and the conjunction.

Notes.—Any difficulty in the play must be sent up for explanation. It is impossible and unnecessary to annotate fully in these columns.

The Lake School of Poetry.—It was pointed out in last month's notes how the writers of the end of the seventeenth and the beginning of the eighteenth century had fallen under the influence of the French rules, and also how the subjects dealt with were to a very large extent subjective and introspective. The result was

that, as a whole, the poetry of that time lacked the virility and strength which characterise the writers of the age of Elizabeth. Towards the end of the eighteenth century these chains were thrown off—not without strenuous opposition—and poets began to write on any subjects which interested them, and to express their ideas in any metre which formed the easiest channel for expression. Wordsworth, who may be called the founder of the Lake School of poetry, wrote poems on such subjects as daffodils, etc.; and the reception given to his writings showed that the nation was tired of the continual contemplation of ethical subjects. Notwithstanding the denunciations of critics, thousands of readers enjoyed his descriptions of the charms of nature; and Coleridge, Southey, Byron, Burns, Shelley, Keats, and Scott followed his lead. This phase of literature must be carefully studied.

Prepositions and Conjunctions.—Prepositions express a variety of relations—time, cause, reason, place, etc. They not only govern nouns and pronouns, but gerunds, infinitives, noun sentences, etc.—for example, "By *doing this* he saved the state," "After *what has been said* I can do nothing." Note that many participles have by use become prepositions—for example, concurring, during, excepting, notwithstanding. In the double forms *among, amongst; amid, amidst,* the second form is stronger than the first. The old preposition *a* in such phrases as, "I go a-fishing," "I am a-coming," is now regarded as a vulgar and redundant manner of speaking, but it was formerly quite correct. *Than* is by some writers used as a preposition—"than whom none higher sat." The words *save* and *but* present some difficulty—for example, "Whence all but he had fled." What is *but*? A preposition? Then *he* ought to be *him*. The full meaning is "All had fled, *but* he had not," and the word is used as a conjunction. So also in "save I alone." *Save* cannot be regarded as a preposition. The full meaning is "I alone being saved" or "excepted." In parsing such words, a note should be written pointing out this peculiar use.

Conjunctions.—Note the double classification—(*a*) co-ordinating and subordinating, or (*b*) according to meaning, time, place, hypothetical, etc.

8. *Geography.*—(*a*) Finish the revision of Africa.

(*b*) Revise Australia. Pay especial attention to the imports and exports, states, and method of government, as compared with those of the Dominion of Canada.

Prepare answers, if necessary, to the following questions (taken from examination papers):—

Africa.—(1.) Name the principal races of Africa, stating which portions of the continent they respectively occupy. Write notes on their appearance and religion.

(2.) Draw a map to illustrate the lake system of Africa, and indicate the countries bordering upon the lakes.

(3.) Name in order of size the principal islands of Africa. To whom do they respectively belong? Show the value and interest attaching to any four of them.

(4.) State as accurately as you can the position of the following; state what you know of each—Alexandria, Blantyre, Freetown, Gondokoro, Ilala, Kimberley, Massowah, Port Said, Pretoria, Rosetta, Tangier.

(5.) What do you know of the geography of Mashonaland, Zanzibar, Abyssinia?

(6.) What is meant by the Soudan, the Cameroons, Somaliland, Oil Rivers District, Rhodesia?

(7.) Rivers which have to fall over the edge of a plateau before they reach the sea prevent the opening up of a country. Explain this with reference to Africa.

(8.) In the geography of Africa what is meant by "the ship of the desert," "extinction of the slave trade," "French Africa," "country of the gorilla and mangrove," "floods of the Nile."

(9.) Describe a journey across Africa from the Congo mouth through Uganda to Zanzibar.

(10.) What do you know of Algiers, Beira, Durban, Fez, Lorenço Marques, Port Elizabeth, Sierra Leone, Walfish Bay?

Australia.—(1.) Draw a map of Australia, and mark in the states and their capitals, Torres Strait, Bass Strait, Cape York, Cape Howe, Arafura Sea, Timor Sea, Great Barrier Reef, Murray River, Swan River, Lakes Torrens and Amadeus.

(2.) Give the situation and chief physical characteristics of the several mining districts of Australia, stating what minerals each produces in large quantities.

(3.) Where are Flinders Land, Cape Leeuwin, Mount Cook, Foveaux Strait, Melbourne? What indications do these names give of the discovery and colonisation of the country with which they are connected?

(4.) Describe the interior of Australia. What effect does a heavy rainfall produce upon it? In what way does a prolonged drought affect the export trade of New South Wales?

(5.) Write a short description of the colony of Tasmania.

(6.) Give some account of the aboriginal inhabitants of Australia, and mention what you know of our relations with them.

(7.) Give an account of the native plant and animal life of Australia, and its mineral products.

(8.) Write a short description of the mountains of Australia.

9. *History.*—1689 to 1714.

Notes on William, Mary, and Anne were given last month.

The chief points in George the First are:—

(1.) The descent of George the First from James the First, and his right to the throne. A genealogical table must be learned.

(2.) The passing of the Riot Act.

(3.) The Jacobite rebellion of 1715.

(4.) The passing of the Septennial Act, extending the duration of Parliament to seven years. Passed as a matter of urgency, it has never been repealed.

(5.) The South Sea Bubble. This must be carefully studied. The scheme was a good one. Its failure was brought about (*a*) by paying a great deal too much for the monopoly of trade, and (*b*) by squandering the money raised. Note that even after the smash the £100 shares sold for £175.

(6.) Atterbury's plot.

(7.) Wood's halfpence and the Drapier Letters, the latter interesting as showing the power of the pen of a bitter and disappointed man to rouse a nation to fury.

10. *Arithmetic.*—Square and cube root and their applications.

Work the following paper:—

(1.) Simplify $\frac{6 - \frac{1}{2}}{120 - 1\frac{1}{18}} \times \frac{22 - \frac{1}{7}\frac{1}{7}}{51 - \frac{1}{7}\frac{1}{7}} \times \frac{156}{161}$, and show that it is equal to the product of three equal fractions. Ans. $\frac{11}{18}\frac{11}{17}$. $\frac{11}{17}$.

(2.) A sum of £1325 is borrowed, to be paid back in 2 years by two equal annual payments, allowing 4 % simple interest. Find the annual payment. Ans. £702.

(3.) A tourist, just before leaving London, has £23, 12s. 6d., and on his arrival in Paris he exchanges what remains for 23 napoleons 12 francs 50 centimes. If 1 napoleon = 20 francs, and 1 franc = 100 centimes, find what he has already spent, the rate of exchange being 25 francs 20 centimes per pound sterling. Ans. £4, 7s. 6d.

(4.) Square 10·162; obtain the cube root of 857,375,000 and the square root of 2·5 correct to three places of decimals. Ans. 103·266·244; 950; 1·581.

(5.) A cubic foot of water weighs 1000 ounces avoirdupois. What is the weight in tons of a rainfall of one inch over an acre of ground? Ans. $101\frac{11}{14}\frac{7}{8}$ tons.

(6.) What is a concrete number? Simplify—

$$\frac{£1, 18s. 6d.}{1078d.} + \frac{\cdot 356181 \text{ cub. ft.}}{1078 \text{ cub. in.}}$$ Ans. 1.

(7.) Determine the difference between the true and the banker's discount on £2500 payable 6¼ years hence, reckoning simple interest at 4 per cent. per annum. Ans. £125.

11. *Algebra.*—Chapter xxxi., Hall and Knight: Surds.

Particular attention must be given to rationalising surd fractions, surd equations, and the square root of a binomial quantity, one or both parts consisting of a surd. Surd equations are very commonly set.

12. *Euclid.*—Props. 9-12, Book II., with six deductions per week.

13. *Elementary Science.*—The occurrence, preparation, properties, and compounds of sulphur, phosphorus, and marsh-gas.

14. *General Information.*—Read up answers to two or three papers in the book of questions used.

Test Paper in General Information.

Answers will be marked gratis if sent direct to Mr. A. T. Flux, Oakleigh, Belvedere, Kent, with stamped addressed envelope for their return. The coupon of the current number *must* be enclosed.

1. What is meant by protective colouring in animals?

2. State exactly why a kettle boils more quickly if placed above a fire than if placed at the same distance below it.

3. What is the meaning of £, s. d., F.P. 6 feet, U.D.C., R.I.P., January 10 Old Style, alias?

4. What is the difference between "impeachment" and "bill of attainder"? Give instances of each from English history.

5. What is a comet? Why is its "tail" always pointed away from the sun?

6. Give instances of ten towns whose names by derivation tell something of their history; for example, Edinburgh—Edwin's burgh—founded by Edwin of Northumbria.

7. What is meant by "patented," "patent applied for," "copyright"?

8. Fill in the missing word:—

(*a*) "..... is matter in the wrong place."

(*b*) "To fresh ..... and pastures new."
(*c*) "..... walls do not a prison make,
Nor ..... bars a ....."
(*d*) "The child is ..... to the man."
(*e*) "'Tis a ..... devoutly to be wished."

Test Questions on the Month's Work.

1. Write as specimens of copy-setting:—
Large hand.—*Johannesburg.*
Small hand.—*Sweet was the sound when oft at evening's close*
Up yonder hill the village murmur rose.

2. Explain exactly how you would proceed in giving a first lesson on greatest common measure.

3. Give in your own words the substance of Bacon's essay on Gardens.

4. Analyse the following, and parse the words in italics:—"It pleases your worship *to say so*, but we are the poor duke's officers; *but truly*, for mine *own* part, if I *were* as tedious as a *king*, I *could* find it in my heart *to bestow* it all of your worship."

5. Write explanatory notes on the following—"Palabras," "Dian in her orb," "the old ornament of his cheek hath already stuffed tennis balls," "a' rubs himself with civet," "an agate very vilely cut," "we'll fit the kid fox with a pennyworth."

6. Describe a journey up the Nile as far as the Great Lakes, pointing out any places of interest you would pass.

7. Explain how the British West Indies are governed. Give a list of the chief British islands, their chief towns and products.

8. To what extent were religious motives responsible for the conclusion of the Civil War? Mention the various sects of Puritans, with their distinguishing beliefs.

9. The policy of Charles the Second has been described as entirely selfish. Discuss this.

10. How would you prepare chlorine? What precautions would you take? Describe its action on turpentine, Dutch metal, and sodium.

11. Work the following:—

(1.) Find the value of $\sqrt{24} \times \sqrt[3]{8} \times \sqrt{1\tfrac{1}{13}} \times \sqrt{1\tfrac{1}{35}}$. Ans. 1.

(2.) Find the square root of—

$$a^2 - a^{\frac{3}{2}}\sqrt{x} + 2a^{\frac{1}{2}}\sqrt{x^3} + 4x(x - \tfrac{1}{4}a).$$

Ans. $a - \frac{1}{2}\sqrt{ax} - 2x$.

(3.) Prove that $a^m \times a^n = a^{m+n}$ when m and n are positive integers. Deduce the meaning of $a^{\frac{3}{2}}$.

(4.) Simplify—

i. $\left(x^{\frac{n}{n-m}}\right)^{n^2-m^2} + \left(\frac{x^n}{x^m}\right)^m$ Ans. $x^{mn}\left(x^{n^2} + x^{-m^2}\right)$.

ii. $\left(\frac{l^{\frac{3}{2}}n^{-\frac{1}{2}}}{m^{\frac{1}{2}}}\right)^2 \times \left(\frac{m^2n^2}{l^2}\right)^{\frac{1}{2}}$ Ans. $l^{\frac{1}{2}}m^{\frac{3}{2}}$.

PUPIL TEACHERS' COURSE.

For Entrance Examination, 1904.

1. *Reading and Repetition.*—Regular oral practice before a competent critic must be taken. Your reading should not be limited to the prescribed book; any good historical novel or book of travels should be read. Similarly with the repetition—many passages will inevitably be met with which are worth committing to memory—the more that is learned, the easier the learning becomes.

2. *Penmanship.*—Write a page in the *Practical Teacher Copy-Book* daily, and take great care at all times. A good style of writing is easily acquired with a little persistent effort.

3. *English.*—(*a*) *Lay of the Last Minstrel*, canto ii. Prepare stanzas 1–15. Learn the exact meaning of all references and allusions. Be prepared to analyse the whole and to parse any word. Write for assistance if any difficulty is experienced.
(*b*) Learn ten roots and their meanings each week.
(*c*) The Greek suffixes.
(*d*) The grammar and syntax of the adverb.
Learn a good classification and exact definitions.

4. *The Geography of Scotland.*—Use sketch-maps continually.
The following questions indicate the scope taken by examiners:—

(1.) Name the principal seaports, describing their position and the character of their industries.

(2.) Name three important rivers in Scotland; state where they rise, what important towns are on their banks, and what is the principal commercial importance of these towns.

(3.) Describe a voyage from Glasgow to Inverness by the Caledonian Canal. Why was this canal made?

(4.) Give a well-arranged general description of the physical features of that part of Scotland lying between the Caledonian Canal and the Firths of Clyde and Forth.

(5.) Describe the islands on the west of Scotland.

(6.) Describe the mountain system in the northern district of Scotland.

(7.) From what causes does Scotland, which was formerly a very poor country, derive much of the wealth it now enjoys?

(8.) Describe position of the Caledonian Canal, Orkneys, Grampians, Ochil Hills, Scotch university towns, Carse of Gowrie.

(9.) In what parts of Scotland are coal and iron found? What are the industries of the Lothians, Dundee, Greenock, Paisley, Peterhead?

(10.) Mention the chief manufactures of Scotland, and the districts and towns where each is carried on.

A very favourite type of question is, "Where and what are the following? Say what you can of six or eight of them." The following names have been given in various examinations—Melrose, Iona, Staffa, Fingal's Cave, Fort William, Cairngorm, Killiecrankie, Haddington, Coruisk, Stornoway, Benbecula, Lerwick, John o' Groats, Campbeltown, Crinan Canal, Carron Ironworks, Trossachs, Strathclyde, Bass Rock, Dundee, Perth, Galloway, Rothesay, Holyrood, Forth Bridge, Loch Katrine, Wyvis, Spey, Ballater, Balmoral, Dunfermline, Loch Leven, etc.

5. *History.*—Henry the First, Stephen, and Henry the Second.
Chief points:—(*a*) Learn the dates of the principal events in each reign.
(*b*) The Great Charter of Henry the First.
(*c*) The investiture dispute—the first of many firm stands made by the English kings against the growth of the papal power.
(*d*) The civil war in the reign of Stephen. Its cause, course, and results. The state of England during the war. The terms of the treaty which concluded it.
(*e*) Henry the Second: his descent, vast dominions, and how they were acquired.
(*f*) The quarrel with Becket—another stand against papal encroachment. Becket wished the clerics to be tried in clerical courts for all offences. The king insisted that for offences against the civil law they should be tried in the civil courts, and carried his point by the Constitutions of Clarendon.
(*g*) The so-called "conquest of Ireland."
(*h*) The rebellion of Henry's sons, and the Scotch invasion.
(*i*) Legal reforms—these are most important—introduction of scutage; revival of the fyrd by the Assize of Arms; the Inquest of Sheriffs, which took the power in the county courts out of the hands of the barons and placed it in the hands of the crown; institution of justices in eyre, or itinerant justices.
(*j*) Note also in this period the growth of the power of the Curia Regis.

6. *Arithmetic.*—Vulgar fractions, and their application to weights and measures.
The theory must be carefully studied. Exact definitions must be learned of all such terms as vulgar fraction, numerator, denominator, compound, complex, proper, and improper fractions.
With compound fractions note particularly the rule of signs. All signs of multiplication and division must be eradicated *before* any addition or substraction is performed. Take great care with the arrangement of the sums.
The following questions have been asked in Government examinations:—

(1.) Explain as to a class the error in the following:—

$$\frac{7}{8} - \frac{2}{3} = \frac{7-2}{8-3} = \frac{5}{5} = 1.$$

(2.) What is meant by the fractions $\frac{1}{2}$ and $\frac{2}{4}$? and show by a diagram that they are equal. What is a complex fraction?

(3.) Prove that if the numerator and denominator of a fraction are multiplied by the same number the fraction is unaltered in amount. Hence take $\frac{9}{11}$ from $\frac{9}{11}$.

(4.) How can you compare the values of fractions by reducing them to a common numerator?

(5.) Prove that $\frac{3}{4}$ of $\frac{2}{3} = \frac{1}{2}$. Show that this is true when the unit is a shilling.

(6.) Write down $\frac{5}{6}$ in words. What fraction of itself must be added to it to make unity?

(7.) Show by diagram that $\frac{3}{4} \div 6 = \frac{1}{8}$.

(8.) What is meant by dividing $\frac{3}{4}$ by $\frac{1}{2}$?

7. *Science.*—Density and its measurement; specific gravity; measurement of time; velocity and angles; inertia and force.

8. *Music.*—The various signs for time in tonic sol-fa and staff notation.

Test Questions.

1. Write as specimens of copy-setting:—
(*a*) Large hand.—*Melrose Abbey.*
(*b*) Small hand.—*Full many a scutcheon and banner riven*
Shook to the cold night wind of heaven.

2. Analyse the following, and parse words in italics:—

"Dejectedly and *low* he bowed,
And *gazing timid* on the crowd,
He *seemed to seek* in *every* eye
If they approved his minstrelsy."

3. Where are the following towns, and for what industries are they noted—Sheffield, Barrow-in-Furness, Middlesboro', Coventry, Redruth, Worcester, Derby?

4. Mention and describe the position of (*a*) five principal seaports of England; and (*b*) the centres of the following industries—biscuits, carpets, cutlery, ribbons, and watches.

5. Point out some of the chief effects of the Norman Conquest on England.

6. Write a life and character of Robert of Normandy.

7. Explain fully what different readings, if any, would be given by a spring balance in the following circumstances, and account for them as far as you can:—

(*a*) When a spring balance carrying a given mass is taken from the Equator to the North Pole.

(*b*) When the same balance is carried down a deep mine.

(*c*) When the balance is taken to the summit of a high mountain.

8. What is meant by standard pitch, concert pitch? Give the mental effects of **r, f, l, t.** How may these be modified?

Second Year Course.

1. *Reading and Repetition.*—These subjects must not be forgotten. Oral practice is very necessary.

2. *Penmanship.*—Ten minutes' daily practice from the *Practical Teacher Copy-Book*, and great care at all times.

3. *Drawing.*—One or two freehand copies per week from photographs of casts and flowers, varied by an occasional sketch from nature.

4. *English.*—(*a*) Goldsmith's *Traveller*, lines 199-245.

The author continues to weigh up the advantages and disadvantages of the Swiss. The lofty mountains, the hard toil, the poor dwelling, only serve to increase their patriotism, and even the storms which rage amidst the mountain peaks only serve to intensify their love of the country. But, on the other hand, their happiness is but of a low type. Pleasure is always derived from the satisfaction of some desire, and where education has not taught the people to long for high and noble things, pleasures are merely physical. The Swiss, being unable to appreciate good literature, music, art, etc., have little variety in their pleasures. The only way they can derive additional enjoyment is by extra eating and drinking, and this soon kills itself. Similarly the higher faculties of the mind are undeveloped, and the people gradually sink to the level of mere animals.

France is an entire contrast. The people seem devoted to lighter and brighter amusement, and are only too ready on any occasion to indulge in their natural love of gaiety. The presence of the author with his flute was quite sufficient excuse for suspending work and indulging in dancing; not for the young only, but even for the aged.

(*b*) Prepare the grammar and syntax of the preposition and the conjunction.

(*c*) Learn fifteen roots and their meanings each week.

(*d*) The changes in the language produced by the Norman Conquest.

The strife of tongues which followed the Conquest, and which lasted some two hundred and fifty years, resulted in the formation of *English*, as distinguished from Anglo-Saxon or Norman-French. The basis was still English, but a very large number of words relating to law, the chase, the church, the nobility, were introduced. The Anglo-Saxon lost many of its inflections, and also its power of forming compounds. This is fully treated in the *Pupil Teacher's English Notebook*. Learn a list of the rules by which you can determine whether a word is of native origin or not.

5. *History.*—George the Second. Chief points:—

(*a*) Learn a life of Walpole, who dominated the history of this period.

(*b*) The Spanish War—Jenkins's ear—Anson's voyage.

(*c*) The War of the Austrian Succession. Why did England interfere? Because of Hanover, which was considered as important as England by the kings then. All the European powers had agreed to let Maria Theresa succeed to the family estates of her father. Frederick of Prussia seized Silesia, and the Austrians naturally fought. The French ranged themselves against the House of Hapsburg, as had been the fashion for centuries. England took part against the French. As Frederick changed sides to suit his own convenience, we were sometimes his allies and sometimes his opponents. Note the battle of Dettingen.

(*d*) The Jacobite rebellion of 1745 was fomented by the French, to compel us to withdraw from the Continental strife. Peace of Aix-la-Chapelle. Note that Frederick kept Silesia.

(*e*) The reform of the calendar—reason why it was necessary.

(*f*) The Seven Years' War (arising partly out of the Austrian Succession). Maria Theresa had formed a powerful coalition against Frederick, and we supported him because he was fighting the French. Note the three phases of the war—(1) In Europe—Hastenbeck and Closter-Seven; (2) in America—Wolfe; (3) in India—Clive. This war laid the foundation of our colonial empire.

6. *Geography.*—The United States. This requires very careful study. The following questions show the scope of the various examination papers:—

(1.) Name some of the great railways and waterways of the United States, and write a full account of one of them.

(2.) Name four of the principal productions of the United States, and say what towns are specially interested in each product.

(3.) Which of the United States border the Gulf of Mexico? Say what you can of the climate and productions of one of them.

(4.) Say what you know about the mouth of the Mississippi River, and also explain how it is that many curved lakes are found near this river.

(5.) Describe briefly the basin of the Mississippi.

(6.) In what states are the following, and for what is each noteworthy—Portland, Concord, Boston, Harvard, Brooklyn, Pittsburg, Baltimore, Richmond, Charleston, Savannah?

(7.) Describe the physical character of the country along the west coast of the United States, including California, Oregon, Washington. Name, in order, the chief rivers and mountains

(8.) Describe exactly how the United States are governed, and how a president is elected.

7. *Arithmetic.*—Simple interest. Be careful to state all these sums by method of unity, and not by formula. The sum should always be worked as a clear model for children to copy.

8. *Science.*—Preparation, properties, etc., of iron oxide and mercuric oxide.

9. *Euclid.*—Props. 1-4, Book II., with four deductions per week.

10. *Algebra.*—Chapter xxx., Theory of Indices: Hall and Knight. Be prepared to prove either of the theorems given.

11. *Music.*—Continue exercises on back work, and learn the meaning of the musical terms used in music. Do not lose sight of the practical part of the subject.

Test Questions on the Month's Work.

1. *Penmanship.*—Write as specimens of copy-setting—(*a*) *Incompatibility;* (*b*) *So blest a life these thoughtless realms display.*

2. Give in your own words the character of the Swiss as depicted by Goldsmith.

3. Analyse the following, and parse words in italics:—

"*Though poor* the peasant's hut, his feast though small,
He sees his little lot the *lot* of *all;*
Sees *no* contiguous palace *rear* its head
To shame the *meanness* of his humble shed."

4. Explain clearly the causes of the War of the Spanish Succession. To what extent did England succeed in the object for which she fought?

5. Describe a journey from Quebec to Vancouver, using the river system as far as possible, and resorting to the railways only when necessary.

6. What is the most thickly populated part of British North America? Describe the position and explain the importance of Halifax, Quebec, Montreal, Vancouver, and New Westminster.

7. What happens when water is poured on quicklime? Why is slaked lime used to make mortar?

8. Work the following:—

(*a*) Write in figures, very distinctly, over each note and rest in the following, its value in pulses or fractions of a pulse.

$$\{\,|\,\mathbf{s} :-.\mathbf{f}\,|\,\mathbf{r}.,\mathbf{f} : \mathbf{s}.\mathbf{f}\,|\,\mathbf{r} :-\,|\,.\mathbf{r} : \mathbf{r}.\mathbf{f},\mathbf{r}\,|\,\mathbf{r} : -.\mathbf{f}\,|\,\mathbf{s},\mathbf{l}.\mathbf{s},\mathbf{f} : \mathbf{r}\,\|$$

(*b*) State briefly the meanings of the following terms—dal segno, allegro, mezzo piano, calando, marcato, fortissimo.

(*c*) If the first note of each of the following passages is regarded as **m**, what will the others become?

(i.) **l d' ta s f r ta r' d'**
(ii.) **t s fe l r fe d' r' t**

OUR CERTIFICATE COURSE FOR 1905.

BY GEORGE COLLAR, B.A., B.SC.,
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TEST QUESTIONS ON LAST MONTH'S WORK.

Theory of Teaching.

1. What are the essentials of good school discipline? Give some of the chief aids by which it may be secured.

2. Describe some of the rewards and punishments commonly employed in schools, and discuss their suitability for children of different ages.

English Language and Literature.

1. At what date was *Richard the Second* most probably written? Discuss the evidence on which your conclusions are based.

2. In which class of dramatic composition would you place *Richard the Second?* and with what objects were such plays written?

3. Which events in Richard's reign are dealt with in the play?

English History.

1. Give an account of the methods of administering justice in Anglo-Saxon times.

2. Say what you know of the English writers before the Conquest.

3. Write lives of two of the following—Dunstan, Canute, Earl Godwin, and Athelstan.

Geography.

1. Explain why the days are longer in summer than in winter. Does the length of the day vary in all parts of the world?

2. Why is the longest day in Edinburgh longer than the longest day in London? Calculate the difference in their lengths.

3. Give an account of the trade winds.

Arithmetic.

1. Explain the terms *number*, *notation*, *subtraction*, and say how you would teach the latter rule.

2. How many lbs., etc., troy are there in 24 lbs. avoirdupois?

Elementary Science.

1. Define matter, and say how you would illustrate its indestructibility. How does the theory of the indestructibility of matter enable you to prove that ice, water, and steam are only different forms of the same substance?

2. What do you mean by the boiling-point of water? How is it determined, and how may it be modified?

NOTES AND SYLLABUS FOR AUGUST.

English Composition.

Study Nesfield's *Senior Composition*, chaps. i., ii., and viii., and work the exercises at the end of them.

Prepare essays on the following subjects:—

1. Courtesy.
2. The war in the Far East.
3. Cycling as a recreation.
4. Compulsory military service.

English Language and Literature.

Study in detail the first act of *Richard the Second*. We shall endeavour to supplement the notes given in the text-book, and hope thus to remove every difficulty. If there are any difficulties not cleared up, students are earnestly requested to write up and have them explained.

Act I., Scene i., line 2. *Band*—that is, bond. John of Gaunt had become surety for the appearance of his son. Both *band* and *bond* come from the same root as the verb *bind*.

7. *Liege*. This word was applied both to the vassal and to the lord. It comes from the Latin verb *ligo*, I bind.

12. *Apparent*, here used in the sense of evident, not in the sense opposed to real.

18. *High-stomached*, full of pride and anger. The ancients thought that the stomach was the seat of pride.

23. *Hap*, fortune or luck; compare the compounds *happen*, *mishap*, *happy*.

27. *To appeal*, to accuse. This legal term is from the Latin verb *appello*, I call to or summon. The person who called the other to trial was called the appellant.

39. *Miscreant*, literally a misbeliever.

43. *Aggravate*, to add weight to. (Latin *gravis* = heavy.)

56. *Would post*, would travel "post haste." The Latin participle *positum* means "placed." Hence the stones set up to mark distances along the principal roads were called posts, and the system of travelling along these roads was called posting. The term post then came to be applied to the carriage of letters in this way.

65. *Inhabitable*—that is, not habitable. We say that a house is habitable, and the prefix *in-* used with adjectives has a negative force. When prefixed to a verb, *in-* means in—so *inhabit* = to dwell in; and from this we get our modern adjective *inhabitable*, which really means habitable, and not the same as the word did in Shakespeare.

85. *Inherit* = to cause us to have. Note the causative sense.

88. *Noble*, a gold coin worth 6s. 8d.

90. *Lewd employments*, improper uses. The word *lewd* meant originally illiterate, as opposed to learned or clerical.

> "How thou lernest the people the lered and the lewede."
> *Piers Plowman*, iv. 11.

103. *Sluiced*, let out as through a flood-gate.

126. *Receipt*, the money received, not the act of receiving, nor the acknowledgment, as it means at present.

144. *Recreant*, one who has denied the faith he once held.

165. *Boot*, remedy, improvement: from the same root as *better*. Among good deeds mentioned in *Piers Plowman*, we find to

> "Do *bote* to brugges that to-broke were"

(to repair or improve bridges that were broken).

197. *Do*, here used in a causative sense. We might supply "anything" after it.

202. *Atone*, to set *at one;* cf. Acts vii. 20, "He thought to set them at one again."

Scene iii. *Lord Marshal*. This was really the acting earl marshal. The Duke of Norfolk held (and still holds) the office of Earl Marshal of England; but being on this occasion one of the combatants, he was replaced by the Duke of Surrey. The Duke of Aumerle was the son of Edward, Duke of York, and perished at Agincourt.

18. *Defend*, forbid. This was the original meaning—cf. French *defendre;* but in line 23, "defending" has the modern meaning of "protecting."

148. *Doom*, judgment or sentence; cf. the verb *deem*, to judge.

150. *Determinate*, to set down the end (term) of.

153. *Pain of life*. We generally say "on pain of death." The "life" is, however, that which is forfeited as a penalty.

167. *Portcullised*. A portcullis is a gate that is drawn up, and can be suddenly lowered in case of attack. The word is from French *porte-coulisse*—that is, a sliding-gate; the verb is *couler*, to slide.

174. *It boots thee not*. See above.

187. *Louring*, from the O.E. *lourying* = frowning. Often spelt "lowering," and applied to tempests; but it has no connection with the adjective "low," and should always be pronounced *louring*.

196. *Sepúlchre*. Note the accent.

205. *Rue*, be sorry for.

241. *A partial slander*, a reproach of partiality.

289. *The presence strewed*—that is, the presence chamber strewn with rushes, which were put on the floor instead of carpet.

293. *Fantastic summer heat*—that is, summer heat that exists only in the fantasy or imagination.

Scene iv., line 8. *Rheum*—that is, moisture or fluid (from Greek *rheo*, I flow).

44. *Largess*. French *largesse*, liberality, gifts. The word is still used in East Anglia for the gratuities given by farmers to their harvesters, and little boys run after coaches crying, "Please to give us a largess."

48. *Blank charters*—that is, schedules with the space for the amount of money which the king's subjects were to be called upon to pay left blank, to be filled up as necessity required.

English History.

Prepare to the end of the reign of Henry the Second. Notice carefully the events leading up to the Conquest, and the social and political changes which were introduced as a result of the Conquest.

The mutual relations between church and state form a very important feature in the history of this period, and the details of the feudal system must be mastered. The duties of the vassal to his lord are generally well known, but it must be remembered that the lord owed certain duties to his vassal. Among these were the administration of justice, and protection against all aggressors. In those troublesome times the benefit of protection was so great that it was largely instrumental in causing the spread of feudalism, for many a small landowner was glad

to surrender his estates to a strong baron or prince, and receive them back under conditions of feudal tenure. The hereditary succession was secured in his family, subject to the payment of certain feudal dues, and these were generally lighter than the death or succession duties paid to the state at the present time.

Geography.

Make a careful study of the geography of Europe. The general build is fairly simple, but becomes rather intricate when worked out in detail. We have an isolated mass of elevated land forming the peninsula of Scandinavia. The western portion of this is much higher than the eastern, and the river valleys are very deep, having been formed almost entirely by the action of glaciers. The fiords, which form such a characteristic feature of the west coast of Norway, have been hollowed out in the same way. This is proved by the fact that many of the fiords are deeper than the open North Sea. If the depressions had been worn out by the action of rivers, the débris could not have been raised to a greater height than that from which it was brought down; hence we must conclude that it was moved by the action of solid ice. The Buerbrae and Bondhus Glaciers, coming down from the great snowfield the Folgefond, are but small remains of the mighty glaciers which at one time existed in those districts.

The other elevated mass, often spoken of as the Alpine System, bears traces of fairly recent glacial action in its upper portions. The higher valleys have largely been formed by glacier action, but river action has done a good deal, and the lower regions and plains seem to owe their forms to rivers alone. In studying the general build of a country or a continent, the student must bear in mind that the mountains have not been piled up, but the valleys have been hollowed out from the mass of elevated land, and the mountains are the parts still left standing high. This accounts for the very irregular course of the watershed, and for the way in which the valleys seem to be interlocked. We will just run briefly through the European mountain system. The mountain ranges of Spain run in a general direction from south-west to north-east. They include the Sierra Nevada, Sierra Morena, Mountains of Castile (Sierra de Gata, Sierra de Gredos, Sierra de Guadarrama), and the Cantabrian Mountains, which are continuous with the Pyrenees. The high land in the south-east of France is cut in two by the narrow valley of the Rhone, the watershed of which on the west is formed by the Cevennes, Côte d'Or, and Plateau of Langres; it then crosses to the Vosges and Jura. About half-way down the latter it follows the Bernese Alps to Mont St. Gothard. The mountain system of Italy is very simple, the Apennines forming the backbone of the peninsula. They are continued into the Maritime Alps, which run west and shelter the Riviera, or district along the coast of the Gulf of Genoa. North of these come the Cottian and Graian Alps, with Monte Viso and Mont Cenis. Next the Mont Blanc group, an immense mountain mass from which the Pennine Alps run eastward. This mass is about sixty miles long, and from fifteen to twenty broad, with numerous transverse valleys opening northwards, and leaving such peaks as the Great St. Bernard, Dent Blanche, Weisshorn, Matterhorn, Breithorn, Lyskamm, Monte Rosa (second highest mountain in Europe), and the Michabel, of which the peak called the Dôm is the third highest point in Europe. This mass is separated from the Bernese Alps by the deep valley of the upper Rhone, and the two join at the Furka, close to Mont St. Gothard, the central point of the Lepontine Alps. From this great centre the Upper Engadine runs to the east and joins the Tyrol. The chief ridge is called the Rhætian Alps, and contains the peaks Piz Languard, Piz Bernina, and Ortler Spitz. East of the Tyrol the mass divides. The south-eastern chain is formed by the Carnic and Julian Alps, which are continued by the Dinaric Alps and the plateau of Montenegro and Herzegovina into the mountain chains of Turkey and Greece. To the north-east the elevation is continued through the Noric Alps to the Little Carpathians, to the north-west of which lies the tableland of Bohemia, surrounded by the Bohmer Wald (south-east), Erz Gebirge (north-west), and the Riesen Gebirge and the Sudetic Mountains (north-east). Thence, running round Hungary, come the Carpathians and the Transylvanian Alps; and although the Danube breaks through the chain at the Iron Gate, these are really continuous, through the Planina Mountains, with the Balkans, the Despoto Dagh, and the other mountains of Turkey and Greece.

The peculiar interlocking arrangement of basins of the Rhine, Rhone, and Danube makes it a little difficult to trace the watershed of the continent in the central district, but the student will learn a great deal from the mere exercise of tracing the watershed. Start at Gibraltar on the map of Europe, and mark with a pencil the line separating the land drained southwards into the Mediterranean and Caspian from the land drained northwards into the Atlantic and Arctic Oceans.

The chief rivers are described with sufficient fullness in the text-books, but the student often fails to recognise that a river runs along the lowest part of the valley, and that the trade routes, as a rule, run along the valleys. In many cases the river itself is used for trade, and vessels pass freely up and down. Sometimes the current is too strong for boats to go against it, and the stream can be used only for the conveyance of material such as timber in one direction—namely, down the stream. Taking the Rhine as an example, we find that in the lowest part—below Cologne—the stream is not too strong for the constant use of boats and barges. Passenger steamers run up as far as Mayence, and powerful tugs go as far as Mannheim. Timber rafts may be seen coming down stream at points higher up still. The makers of roads have invariably followed the course of the river valleys, and the engineers who have constructed railways have generally taken advantage of the levelling work performed by water. A glance at the map shows how closely the railway keeps to the valley of the river in such cases as the Great Western Railway to the Kennet and Thames, and the Midland, which traverses the difficult district of Derbyshire by following the course of the Derwent. The Eden, the Witham, the Great Ouse, and the Don have lines laid by their sides; while the Western Railway of France follows the Seine, and the Rhine has a railway on each bank. The chief transcontinental routes should be traced out, and their relation to the river valley should be noted.

Arithmetic.

The chapters on factors, G.C.M., and L.C.M. are not intended merely as preparatory to the working of vulgar fractions. They contain a large amount of matter on the theory of numbers, which is of use in nearly every section of arithmetic; hence they should be most carefully studied, and all the examples worked. A *Key* is published for the use of those students who have not the advantage of a master's help.

Algebra.

Continue the revision to the end of division, and observe the method of proving whether one expression is divisible by another. The question often appears in this form: What must be the value of x if $6x^4 + 5x^3 - 16x^2 + 25x - 17$ is exactly divisible by $3x^3 - 2x + 1$?

Begin by performing the division in the ordinary way.

$$
\begin{array}{l}
3x^2 - 2x + 1)\,6x^4 + 5x^3 - 16x^2 + 25x - 17\,(2x^2 + 3x - 4 \\
\qquad\quad 6x^4 - 4x^3 + 2x^2 \\
\qquad\quad \overline{\qquad\qquad 9x^3 - 18x^2 + 25x} \\
\qquad\qquad\quad 9x^3 - 6x^2 + 3x \\
\qquad\qquad\quad \overline{\qquad\quad - 12x^2 + 22x - 17} \\
\qquad\qquad\qquad - 12x^2 + 8x - 4 \\
\qquad\qquad\qquad \overline{\qquad\qquad 14x - 13}
\end{array}
$$

As we cannot continue the division without involving negative powers of x, it is evident that the only condition under which the division can be finished is that the remainder at this stage equals nought.

$$14x - 13 = 0;$$

that is, $$x = 1\tfrac{13}{14}.$$

It will be found on trial that if $x = 1\frac{13}{14}$, the expression $6x^4 + 5x^3 - 16x^2 + 25x - 17$ is divisible by $3x^2 - 2x + 1$; for all other values of x the division cannot be completed without a remainder. The problem would be similarly worked if some of the coefficients had been letters; the division is worked as far as possible, and the remainder equated to zero.

If we take a case in which the quotient may be equated to zero instead of the remainder, we can prove a very important and very interesting theorem, called the "Remainder Theorem." It is as follows:—*The remainder obtained in dividing an expression in* x *by* x − a *is equal to the value obtained by substituting* a *for* x *in the expression itself.*

Suppose the expression $Ax^m + Bx^{m-1} + Cx^{m-2} + \ldots Mx^2 + Nx + P$ is divided by $x - a$: then as the highest power of x in the divisor is the first, it follows that the division can be carried out until x does not appear in the remainder at all. Let Q be the quotient, and R the remainder. Then

$(x - a)\,Q + R = Ax^m + Bx^{m-1} + Cx^{m-2} + \ldots Mx^2 + Nx + P.$

Now this relation is true for all values of x, including the case in which $x = a$. Substitute this value, and we obtain the equation

$(a - a)\,Q + R = Aa^m + Ba^{m-1} + Ca^{m-2} + \ldots Ma^2 + Na + P.$

But since $(a - a) = 0$, the left-hand side of the equation becomes R, and the left is the expression formed by substituting a for x in the original expression. Hence

$$R = Aa^m + Ba^{m-1} + Ca^{m-2} + \ldots Ma^2 + Na + P,$$

and the theorem is proved.

We will just take one or two numerical illustrations.

Find the value of the remainder if $2x^3 - 3x^2 + 4x + 5$ is divided by $x - 3$. According to our theorem it will be

$2 \times 3^3 - 3 \times 3^2 + 4 \times 3 + 5 = 54 - 27 + 12 + 5 = 58$.
The student can test the result by ordinary division.

This theorem may be used in proof of the rule for divisibility by 9, for $9 = (10 - 1)$, and any number, such as 3724, is really equal to $3 \times 10^3 + 7 \times 10^2 + 2 \times 10 + 4$. According to the remainder theorem, if this be divided by $(10 - 1)$, the remainder will be the expression obtained by substituting 1 for 10—that is, $3 \times 1^3 + 7 \times 1^2 + 2 \times 1 + 4$; and as all powers of 1 are simply 1, this is equal to the sum of the digits. Hence any number in the ordinary decimal scale is equal to a multiple of 9, plus the sum of the digits.

If this remainder is equal to 0, the original expression is divisible by $x - a$. Hence we have the following very important corollary: If an algebraical expression in x vanishes when a is substituted for x, it is divisible by $x - a$.

The following are applications of the rule:—

$x^3 - 3ax^2 + 3a^2x - a^3$ is divisible by $x - a$.
$x^2 - 5ax + 4a^2$ is divisible by $x - a$.
$x^4 - 3x^3 + 2x^2 - 8x + 8$ is divisible by $x - 1$.
$x^2 - 7x + 12$ is divisible by $x - 3$ and by $x - 4$.

The student will be able to recognise at a glance all expressions which are divisible by $x - 1$, because the sum of their coefficients will equal zero.

In considering the conditions under which the rule could be applied to $x + a$, we remember that $x + a = x - (-a)$, and that all the odd powers of $(-a)$ are negative, and all the even powers are positive. Hence we make the substitution as before, but change the sign of the odd powers of x, the even powers of $(-a)$ being identical with the corresponding even powers of $(+a)$.

$x^3 + 3ax^2 + 3a^2x + x^3$ is divisible by $x + a$, because $-a^3 + 3a \cdot a^2 - 3a^2 \cdot a + a^3 = 0$.

$x^2 + 8x + 12$ is divisible by $x + 2$; for on writing -2 for x we obtain $4 - 8 \times 2 + 12 = 0$.

Geometry.

Finish the first book of Euclid, and work deductions.

Theory of Teaching.

Before beginning in detail "the methods of teaching the ordinary subjects in an elementary school," it is necessary to consider the general principles which are applicable to the teaching of them all. These are set out in the fifth chapter of the text-book, and the student must see that maxims have their full meaning. We would also call the attention of the student to the relation that must exist between the subject and the proportion of interrogation and exposition in its treatment. Teachers frequently attempt to "elicit" from children facts of which they are entirely ignorant, and which they cannot possibly deduce from knowledge they have. This is a worse fault than excess of lecturing. Again, some teachers run mad on the theory that all answers should be in complete sentences. There is a limit to this, and there are cases in which the answer should not be given in complete sentences.

At this point we should advise all our readers to take up the study of psychology. It will help them greatly in their work, and one of the parts of the subject that bears most on teaching is the doctrine of "apperception," which teaches us the necessity of putting the new matter into proper relation to the matter already in the child's mind. Space precludes the full discussion of it here; it is dealt with briefly in the text-book, under the motto, "Proceed from the known to the unknown;" but the student will do well to read up the subject in Dexter and Garlick's *Psychology for the Schoolroom*, and in a little book entitled *The Essentials of Method*, by C. de Garmo (Heath and Co.). Following out the division of the lesson based on the views of the followers of Herbart—the apostle of apperception—the first step consists of the "preparation." This is an introduction to the study of the subject before the class; but although every preparation is an introduction to the lesson, we often come across an introduction which is not a preparation. Very frequently a young teacher "introduces" his subject by leading the child to guess the name at the top of his notes of lessons. Now, the essential work of a good preparation is to marshal up the information to the children so that it may form a foundation on which the new matter may rest; or rather, as no one figure exactly conveys the right idea, we may employ several, and say that the old matter must be used as spectacles through which the new is properly seen—it must be made to come out and welcome the new matter and to assimilate itself to it. The next step is the presentation, and much of the ease with which new matter can be presented depends on the care with which the right parts of the child's previous knowledge have been prepared in the first section to receive it. In this step illustrations and experiments are to be used, in order to drive the information home. Most authorities make "association" the third step in the lesson; that is to say, they deliberately set apart a section of the lesson to call attention to the relation between the subject-matter of the lesson and various related subjects. Whether this is done or not, it is important that no particle of information should be presented in an isolated manner, but its relation to other things should be shown. Having studied a number of similar examples, the class should now be induced to generalise and draw up a statement that applies to them all. In the case of a grammar lesson this statement would be the definition; in an arithmetic lesson the rule for working is drawn up from the consideration of the examples. This process is called the "formulation." But the nature of children is such that they delight in doing exercises and applying what they have been taught; hence the lesson should wind up with an "application."

Notes of lessons may be drawn up in two columns or in paragraphs, according to the student's fancy. If two columns are used, and are headed "Matter" and "Method," care must be taken that the first contains nothing but a statement of the information to be imparted, while the second should indicate in a brief manner the way in which the different sections of the subject-matter are to be treated, and on this account the name "treatment" is a much better one than "method." But whichever form the notes take, the arrangement of the lesson into four steps (or five, if we take "association" separately) is essential.

Elementary Science.

Prepare the chapter on the characteristics of matter. The essential quality of all matter is that it occupies space. Be careful to avoid the incorrect definition that it is whatever affects our senses. Sound, light, heat, hardness, colour, and the qualities of bodies affect our senses, but these are not matter itself. It is sometimes said that matter is that which has weight; but since weight is due to a *mutual* attraction between two or more bodies, if there were only one body in the universe there could be no such thing as weight, but that body would still consist of matter. Although it is not advisable to give the possession of weight as a property on which to base the definition, it is one of the most general properties of matter. So common is it that we very commonly take the weight of a body to be the measure of the amount of matter that it contains. This, however, is only true within certain limits, because the weight of a body near the earth's surface consists of two factors, one of which is the amount of matter in the body, and the other varies with its position. The name by which we denote the amount of matter in a body is *mass*, and it is of the greatest importance that mass should not be confounded with weight. If we conduct experiments in weighing at the same place, we find that if we take only half the amount of substance its weight will be half the weight of the whole, and so on; and under these circumstances the weight of a body is proportional to its mass. But if we take the same body and weigh it by means of a spring balance in different localities, we shall find that its weight is not the same. A body weighs less at the top of a mountain than at sea level. This is generally stated to be due to the fact that it is farther from the centre of the earth. Really, it is the result of being farther away from all the particles of which the earth is composed. The former statement often leads students to say that a body would weigh more at the bottom of a deep mine than at the surface, but this is not the case. If a body is weighed at the bottom of a mine, there are large portions of the earth above the body, and these attract it upwards; and at the same time there are fewer portions below drawing it downwards than when it was at the surface. Consequently it will weigh less; and if it were possible to take the body and the weighing-machine right to the centre of the earth, it would weigh nothing at all.

Another universal property of matter, as far as we can ascertain, is *inertia*. This is the property in virtue of which a body will remain in a state of rest or in a state of uniform motion in a straight line, unless compelled to change its state by some force acting upon it.

Mass and volume are fundamental quantities, and when we establish a relation between them we have a derived quantity which we call *density*. This we define as the mass of a unit volume of a substance.

It follows from this definition that if we wish to compare the densities of two or more substances we must take the same units of volume and mass. A pint of pure water weighs 20 ounces, and a gallon of sea-water weighs 10·26 pounds. Hence we should be justified in saying either that the density of pure water is 20, or that the density of sea-water is 10·26. But we must not make these two statements together, or else we shall imply that the same units have been taken in both instances, and this is not the case. If we agree to take the gallon and the pound in both cases, then since a gallon of pure water weighs ten pounds, we can say its density is 10, and that of sea-water is 10·26.

OUR SCIENCE SECTION

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PHYSIOGRAPHY.

(STAGES 2 AND 3.)

Inclusions in Granite.—In some granites we find fragments of other rocks which differ from the granite itself both in composition and in structure. These included rocks often consist of fragments of slate, mica schist, hornblende schist, gneiss, or other rocks, which have been more or less metamorphosed. What is the probable origin of these inclusions? It seems probable that, before the crystallisation of the main mass of the rock took place, the molten rock was moving or flowing onward amongst the surrounding beds, and that in the process it broke off pieces from these and carried them away with it. The fact that many of the fragments are arranged in approximately parallel lines lends support to this view, for this arrangement would evidently be produced if the molten rock were flowing onward previous to solidification. The fragments are usually angular or subangular, and the surrounding granite has crystallised around them, so as to form apparently one rock. Sometimes we find in granites portions which appear from their different structure to be included fragments, but which on close examination prove to be portions of the granite itself in a finer state of crystallisation than is the case with the remainder. These concretions, or "nests" as they are termed, unlike the included fragments, are usually oval or rounded; but the way to decide as to whether a particular example is a nest or an included fragment is to determine the mineralogical composition by means of the microscope.

Pressure and Boiling-point.—If we heat water in an open flask by means of a flame beneath, convection currents are set up in the liquid, and these tend to keep the water at approximately the same temperature throughout by constantly causing the warmer and cooler portions to intermingle. As the temperature rises, we find bubbles of gas begin to form at the bottom of the vessel and ascend through the liquid. At first the bubbles are small, and as they ascend they get smaller still, and disappear before they reach the surface. The reason for this is that at this stage the water nearest the flame is at the highest temperature, and the gas or steam which forms at the bottom of the flask is cooled and condensed back to water before it reaches the surface. When a bubble collapses rather suddenly, a sound is produced; and when a considerable number collapse consecutively, as is the case with the bubbles rising through the water, a continuous sound is produced. (A similar sound is produced in a kettle just before the water boils, and we speak of it as the singing of the kettle.) As time goes on the bubbles are able to rise higher and higher through the liquid before collapsing, and in a short time we find that they rise to the surface, and the vapour escapes.

A few moments later we find that instead of contracting as they rise, the bubbles actually expand. The liquid is now boiling vigorously, and a thermometer placed in the water or escaping steam records a constant temperature. This temperature is termed the boiling-point. Under ordinary conditions this temperature is always somewhere in the neighbourhood of 100° C. On one day, however, we may find that the boiling-point is 99·5° C., and on another perhaps 100·5° C. If we read the height of the barometer at the same time, we shall find that for the higher boiling-point the barometric pressure is the higher. This is always so, and we find, in fact, that the boiling-point depends on the pressure. This is not difficult to explain.

Before the steam can form into a bubble, it must be able to force back the liquid which is pressing on it on all sides. Now, the pressure exerted by the vapour is called the vapour pressure of the liquid, and so we may say that, before the bubbles can form, the vapour pressure of the liquid must be at least equal to the external pressure. Now we may assume that when the liquid is vigorously boiling it is all at practically a uniform temperature, and therefore no cooling of the vapour can occur while in the liquid. The pressure at the bottom of the flask where the bubbles form is that due to the atmosphere plus that due to the height of the liquid. As the bubbles rise, although the atmospheric pressure may remain constant, the pressure due to the liquid gets less, and this allows the bubbles to expand slightly.

It will be quite evident that if the atmospheric pressure increases, the vapour will have to be capable of exerting a greater pressure before the bubbles can form; and this means that the temperature of the liquid will have to be raised, for the vapour pressure increases as the temperature rises.

We may then easily determine by experiment the changes produced in the boiling-point by changes in barometric pressure. We find that for each definite pressure there is one, and only one, boiling-point. Now the pressure exerted by the atmosphere in the same place varies only within comparatively narrow limits; and if we wish to determine the changes produced in the boiling-point of water at higher and lower pressures, we must adopt other methods, for we can only alter the boiling-point by altering the pressure to which the liquid is subjected. A ready method of increasing the pressure on the water is to place the water in a strong vessel, with a very small adjustable opening at the top, so that any steam generated cannot escape very freely. If we place a thermometer and a pressure-gauge within the vessel, we can take simultaneous readings of the pressures and the corresponding temperatures. By adjusting the size of the steam outlet and the size of the flame beneath the vessel, we can cause the pressure and temperature to rise. Precautions must, however, be taken to make the pressure no greater than the vessel will stand, otherwise an explosion may be the result. Other methods, however, may be employed, the only thing that is necessary being to determine the vapour pressure and temperature simultaneously when the pressure on the liquid is due to its own vapour alone. The same applies to pressures below atmospheric pressures. Next month we will give a description of suitable apparatus for actually carrying out the experiments, but we will for the present glance at some of the results which have been obtained by such experiments. The pressures are generally expressed in millimetres of mercury. Now, since the pressure exerted by a column of mercury depends upon the pull exerted on it by the earth, we ought to state the latitude in which the results were obtained.

The following table gives a selection from results obtained at Paris (lat. 49° 45′).

Pressure (in mm.).	Temperature (centigrade).	Pressure (in mm.).	Temperature (centigrade).
0·386	− 30°	91·982	50°
0·927	− 20°	148·791	60°
2·093	− 10°	233·093	70°
4·263	− 1°	354·643	80°
4·600	0°	525·450	90°
4·940	+ 1°	707·280	98°
5·302	+ 2°	733·305	99°
9·165	+ 10°	760·000	100°
17·391	+ 20°	787·590	101°
31·548	+ 30°	816·010	102°
54·906	+ 40°	3581·23	150°
		11688·96	200°

It is evident from this table that we may have water boiling at very low temperatures. We might, in fact, have it boiling when its temperature is only a very little above its freezing-point.

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(Obviously water in the solid state cannot be in a state of ebullition, but it can and does give off vapour, and this vapour exerts a pressure in the usual way.)

The drop in boiling-point due to fall in pressure often causes inconvenience to mountain climbers, who find that at considerable altitudes they cannot by the ordinary cooking utensils make their food hot enough to cook it properly. Obviously the way to overcome the difficulty is to heat the food and water in a closed vessel with a suitable safety-valve, so that the temperature may be raised to a suitable degree. The following question was recently set at one of the examinations conducted by the Science and Art Department: "Why is it difficult to make good tea on the top of a high mountain? How could the difficulty be got over?" According to the report of the examiners, some of the candidates in their answers suggested that the only way would be to go down the mountain to make the tea, while others thought the tea should be made before starting, and warmed up on the mountain. Those who realised that increase of pressure would effect the object quite overlooked the simple contrivance of a closed vessel, and suggested elaborate devices for pumping in air, digging a deep hole, or some similar absurdity.

CHEMISTRY.

(ADVANCED AND HONOURS.)

BY C. A. WEST, B.SC., A.R.C.S., F.I.C.

A Peculiar Case in which the rate of a chemical reaction is diminished by rise of temperature has been observed and verified by Clara C. Benson (*J. Physical Chem.*, 1904, 116–121). It was found that in solutions containing chromic acid, potassium iodide, and ferrous sulphate, the rate of liberation of iodine was less at 30° C. than at 0° C., although the course of the reaction appears similar in both cases.

The Solidification of Hydrogen.—Morris W. Travers, in the *Proc. Roy. Soc.* 1904, 181–183, gives an account of his experiments on the solidification of hydrogen. Hydrogen had previously been found to remain liquid down to 14·2° (helium scale), but solidified when the pressure fell to 49 or 50 mm. of mercury at a temperature of 14·1°, but no observations of its appearance were made. Travers has modified and repeated the experiments to determine whether the glassy substance described by Dewar is crystalline, or only a highly viscous liquid. On causing the liquid hydrogen to boil in a vacuum it did not appear to become viscous, but films of glassy substance formed at the surface and broke as the bubbles rose. The constancy of the melting pressure, and the sharpness with which the solid was formed, lend great support to the view that solid hydrogen is a truly crystalline substance, and not a pseudo-solid.

Density of Fluorine.—The experimental figure 1·260 given for the density of fluorine differing considerably from the theoretically calculated value 1·316, has led to the suggestion that gaseous fluorine may be a mixture of atomic and molecular fluorine—a supposition which might also be taken to explain to some extent the great chemical affinity of the substance. Professor Henri Moissan has therefore redetermined the density of the gas by Regnault's method, using a glass globe in place of the platinum vessel which he employed in his earlier work. The glass globe was filled with nitrogen and weighed, then filled with fluorine and re-weighed, a correction being made for the residual nitrogen. The figure 1·310 was obtained as the mean of four determinations. This figure is so close to the theoretical value 1·316, calculated from F = 19·05, that it effectually disposes of the view of the possibility of the existence of free atoms in gaseous fluorine.

Electrolytic Preparation of Aluminium.—A mixture of sodium aluminium fluoride and sodium thio-aluminate ($2Al_2F_6 + 6Na_2S = Al_2F_6, 6NaF + Al_2S_3, 3Na_2S$) may be electrolysed in the fused state. The thio-aluminate appears to be decomposed by the current (Al_2S_3, $3Na_2S = 3Na_2S + 2Al + 3S$), and the fused sodium sulphide then reacts with the double fluoride thus:—

$$Al_2F_6, 6NaF + 3Na_2S = 12NaF + 2Al + 3S.$$

In this process bauxite is used, and is first dissolved in hydrofluoric acid; precipitated alumina or bauxite is then added to remove iron, silicon, and titanium. The sulphur produced during the operation is afterwards burned to sulphuric acid, which is then used to prepare the hydrofluoric acid from the sodium fluoride formed in the electrolysis. The sodium sulphate thus produced is heated with coal to regenerate sodium sulphide.

Optical Properties of Vitreous Silica.—J. W. Gifford and William A. Shenstone, in the *Proceedings of the Royal Society*, give an account of the optical properties of vitreous silica.

This substance exhibits properties which should render it of great value for optical work. These properties may be briefly summarised. It is indifferent to most corrosive fumes, it is transparent to ultra-violet radiations, it is not doubly refracting, its refractive index is low, and identical meltings can be made.

Measurements of the refractive index were made with prisms made in various ways, one being made up from four separate meltings. This was, however, almost indistinguishable from the simple prism. The variation of the index of refraction with the wave-length will be seen from the following table.

Wave-length.	Index.	Wave-length.	Index.
7950	1·45339	3034·21	1·48688
C 6563·04	1·45641	2445·86	1·51096
D 5893·17	1·45844	2062·	1·54271
F 4861·49	1·46316	1852·2	1·5743.

The dispersion is a little greater than that of quartz. A thin lens of vitreous silica was achromatised by one of fluorite, and was found to possess a focal length almost independent of the wave-length. Thus with a focal length of 1·00000, at wave-lengths 7950 and 1852 the greatest variations reached 1·00086 for the D line and 0·99054 for wave-length 2446. The indices of refraction in the table are probably in almost all cases correct to 1 in the fifth decimal place.

Chlorination of Carbon Disulphide.—If dry chlorine is passed through carbon disulphide (300 grams), mixed with finely

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SEPARATION OF THE METALS OF GROUP III.(*c*).

(PHOSPHATES BEING PRESENT.)

Dissolve the precipitate in the smallest possible quantity of dilute HCl, nearly neutralise with *solid* Na_2CO_3 so as not to increase the bulk more than necessary. If the solution has been warmed, cool and then add an equal bulk of the mixture of sodium acetate and acetic acid. (If a red colour appears, this shows that more iron is present than is necessary to combine with all the phosphoric acid radical.) Boil and filter hot. If the solution was red (indicating excess of iron), the boiling must be continued until all the colour is discharged.

The precipitate may contain phosphates or basic acetates of iron, aluminium, and chromium, and should be examined by the table for Group III.(*a*).

If the additional acetate above gave a red coloration, all the phosphate has been removed, and the solution can be examined by Tables III.(*a*), III.(*b*), IV., and V. for the remaining metals. If no precipitate was produced, all the phosphates still remain in solution. In any case, test a portion of the solution with a drop of a dilute solution of Fe_2Cl_6. A red coloration shows that no phosphates remain. If, on the other hand, a precipitate is produced, add Fe_2Cl_6 drop by drop until no further precipitate is produced and the solution is red. Dilute with water, boil, and filter at once. Repeat the boiling if necessary, to discharge all the red colour.

The precipitate may be neglected, as it consists of the iron combined with the phosphate and acetate radicals.	To the solution (free from red colour) add AmCl, boil, and add AmOH.			
	Any precipitate consists of aluminium and chromium. Examine by Table III.(*a*).	Through solution pass SH_2.		
		Precipitate. Examine by Table III.(*b*).	To solution add Am_2CO_3.	
			Precipitate. Examine by Table IV.	To solution add Na_2HPO_4. A white precipitate shows presence of magnesium.

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powdered anhydrous aluminium chloride (5 grams), the gas is totally absorbed, and carbon tetrachloride and disulphur dichloride are the products. Carbon chlorosulphide, $CSCl_2$, which is formed when carbon disulphide is chlorinated in the presence of iodine, is not produced, and it appears that the whole of the disulphide is converted into the tetrachloride before any sulphur dichloride is formed. When a mixture of bromine and carbon disulphide is heated with anhydrous aluminium chloride or bromide, carbon tetrabromide is formed; but the yield is small, and other reactions probably take place.

THEORETICAL MECHANICS.

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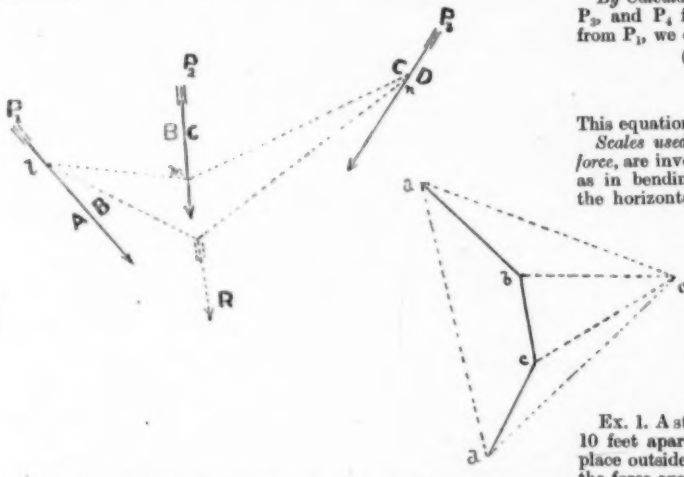
BY FRANK CASTLE, M.I.M.E.,

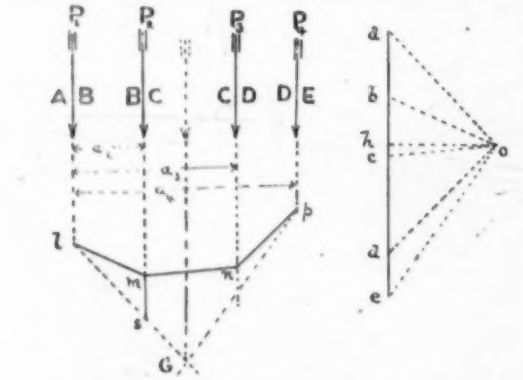
Royal College of Science; Lecturer on Mechanics, etc., Morley College, London; Author of "Elementary Practical Physics," "Practical Mathematics," etc.

Forces which do not act at a point.—In the processes for dealing with any number of forces acting at a point, *the position* of the resultant is known; its direction and magnitude have to be determined. In the more general case in which the given forces are in various positions in a plane the position also must be obtained.



Let P_1, P_2, P_3 denote three forces in one plane; then the magnitude, direction, and position of the resultant may be obtained either by graphical methods or by calculation. In the former it is convenient to use Bow's Notation—that is, to denote each given force by two letters, one on each side of the line denoting the force.

To draw the force polygon, make *ab* equal in magnitude and direction to AB or P_1. Similarly *bc* and *cd* denote P_2 and P_3



respectively. The magnitude and direction of the resultant are given by the line joining the initial point *a* to the final point *d*.

To determine the position of the resultant, draw lines from any convenient point *o* to the points *abcd* (the point *o* is usually placed so that the lines *oa*, *ob*, etc., do not either coincide or intersect). In the space B draw a line *lm* parallel to *ob*, and in the space C a line *mn* parallel to *oc*; finally lines from *m* and *n* parallel to *oa* and *ob* respectively, and intersecting at G: determine the position of the resultant.

A special and important case occurs when the given forces all act in the same direction and constitute a *system of parallel forces*. The direction of the resultant will obviously be the same as the given forces, and its magnitude the algebraic sum of the forces.

Ex. 1. Show how to determine the resultant of two parallel forces by a graphical construction. Extend the method to finding the resultant of three or more parallel forces.

(Inter. Sci., 1903.)

Let P_1, P_2, P_3, and P_4 denote four parallel forces. These may be indicated in the usual manner by AB, BC, etc., as shown.

To any convenient scale make $ab = AB = P_1$. Similarly *bc*, *cd*, and *de* are equal to P_2, P_3, and P_4 respectively. The magnitude and direction of the resultant are given by the line *ae*.

Join these points to any convenient pole *o*. Draw *lm* parallel to *ob*, *mn* parallel to *oc*, and *np* parallel to *od*; finally, lines drawn parallel to *oa* and *oe* determine, by their point of intersection G, a point in the line of action of the resultant. It will be obvious that the same process may be used to determine the *centre of parallel forces*, or the *centre of gravity*.

By Calculation.—Let a_2, a_3, and a_4 denote the distances of P_2, P_3, and P_4 from P_1; then if x is the distance of the resultant from P_1, we obtain—

$$(P_1+P_2+P_3+P_4)x = P_2a_2+P_3a_3+P_4a_4.$$

$$\therefore x = \frac{P_2a_2+P_3a_3+P_4a_4}{P_1+P_2+P_3+P_4}.$$

This equation determines x.

Scales used.—It will be noticed that two scales, *linear* and *force*, are involved in the preceding; also for many purposes, such as in bending moment problems, etc., it is advisable to make the horizontal distance of *o* (measured on the linear scale) from the line *ae* some convenient number such as 10, 100, etc.

Bending Moment.—If we assume the four forces P_1, P_2, P_3, and P_4 to act on a rigid bar, then the bending moment at any section—or in other words, the moment of all the forces on one side the section—may be obtained. Thus the bending moment at a point, such as the point where the force P_2 acts, is the intercept *ms* multiplied by *oh*. A proof of this is easily obtainable, and may be found in any text-book on mechanics.

Ex. 1. A straight bar passes through two rings at the same level 10 feet apart. From it a weight of 250 lbs. is suspended at a place outside the rings, and two feet from the nearest one. Find the force exerted by the bar on each ring owing to this load.

(B.A., 1899.)

Taking moments about the nearest ring, then if Q denote the force exerted by the bar, we obtain—

$$250 \times 2 = 10 \times Q.$$

$$\therefore Q = 50 \text{ lbs.}$$

Again taking moments about the point where the weight is applied, and denoting the force on the nearer ring by P, then we have—

$$P \times 2 = 12 \times Q = 12 \times 50.$$

$$\therefore P = 300 \text{ lbs.}$$

Hence the forces exerted on the rings are 300 lbs. and 50 lbs. respectively. It is obvious that the former is downward and the latter upward.

Ex. 2. Determine the force which will balance two given parallel forces. (Inter. Sci., 1903.)

Ex. 3. Prove that the moment about any axis of three forces in equilibrium is zero.

Prove that if a straight bar supported at the ends is strained by a force, the moment at any point tending to bend the bar is proportional to the distance from one end or the other of the bar.

(Inter. Sci., 1903.)

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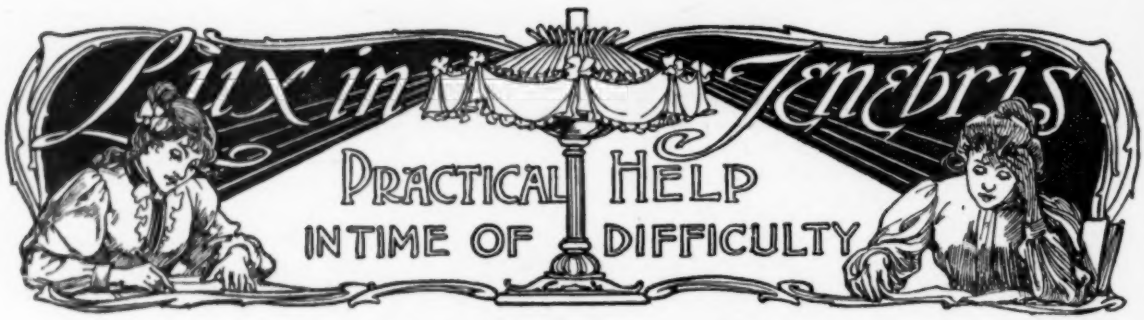

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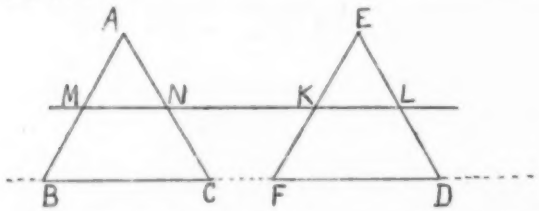
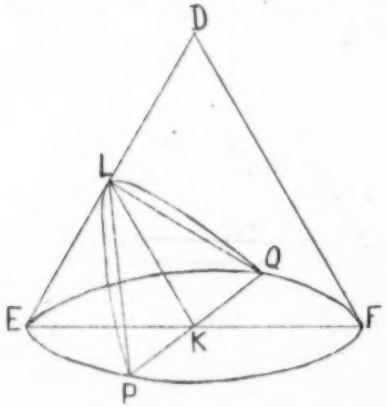
Arum.—Two equal right circular cones which do not float in water have a vertical angle of 60°. They lie on the horizontal floor of a tank, one resting on its plane base, the other on a generator. If the centre of the base of the second cone is in the horizontal surface of the water, show that the volumes immersed are as 7 : 6.



Let ABC, DEF be sections of the cones made by a vertical plane through the axes, and let K be the centre of the base of the second cone. Let the horizontal through K cut ED, AC, AB in L, N, M.

Now since the vertical angle of either cone is 60°, it is manifest that each of the triangles ABC, DEF is equilateral. Then, since K is the middle point of EF, L, N, M are the middle points of DE, AC, AB. It follows at once, then, that seven-eighths of the volume of the first cone is immersed. Hence, if the postulated relation between the volumes immersed is true, three-fourths of the volume of the second cone should be immersed. It is easy to show that this is *not* the case. Let PQ, the



diameter of the base of the second cone, which is at right angles to EF, be drawn as shown in Fig. 2. The portion of the second cone left in the air is bounded by the semicircle PEQ, the parabola PLQ, and the portion of the convex surface of the cone intercepted between these two planes. Draw the *chords* PL, LQ. It is obvious that the solid bounded by the semicircle PEQ and the surface generated by a *straight line* passing through L and also in succession through each point in the arc of the semicircle PEQ and its diameter QKP has its volume equal to one-fourth of the volume of the cone DEPFQ. But the volume of that portion of the cone which is intercepted between the base PEQ and the parabola PLQ is clearly greater than the volume of this solid. It follows, therefore, that *less* than three-fourths of the volume of the second cone will be immersed. The portions immersed are therefore *not* in the ratio of $\frac{7}{8} : \frac{3}{4}$—that is *not* in the ratio of 7 : 6.

Civis.—A heavy uniform rod, 6 feet long, of which the weight is 36 lbs., rests against a *smooth* wall. The other end rests on a *smooth* horizontal floor, and is kept in position by a rope tied thereto, of which the other end is attached to the wall. The rod and the rope make respectively angles of 45° and 30° with the horizontal. Find the pressure of the wall and the tension of the rope.

Since the wall is smooth, the pressure of the wall is normal to its surface. Let P denote the magnitude of the pressure in pounds. Then by taking moments about the lowest point of the rod, we have—

$$P \times 6 \cos 45° = 36 \times 3 \cos 45°.$$
$$\therefore P = 18 \text{ lbs.}$$

Again, let T be the tension of the rope, and R the normal reaction of the smooth floor, both in pounds. Then by taking moments about the highest point of the rod, we have—

$$T \sin 15° + 18 \cos 45° = R \cos 45° \quad . \quad . \quad . \quad (1).$$

Again, resolving all the forces along the rod, we have—

$$T \cos 15° + R \cos 45° = 36 \cos 45° + P \cos 45°.$$

But we have seen that P = 18 lbs.

$$\therefore T \cos 15° + R \cos 45° = 54 \cos 45°$$

Hence, and from (1), we have—

$$T(\cos 15° + \sin 15°) + 18 \cos 45° = 54 \cos 45°.$$
$$\therefore T(\cos 15° + \sin 15°) = 36 \cos 45° = 18\sqrt{2}.$$

From four figure tables cos 15° = 0·9659, and sin 15° = 0·2588.

$$\therefore T = \frac{18 \times 1{\cdot}414}{1{\cdot}2247} = 20{\cdot}8 \text{ lbs., nearly}$$

Bike.—A parabola is drawn so as to pass through two fixed points, and to have its axis parallel to a given straight line. Show that the locus of its focus is a hyperbola having the given points as foci. (Stage IV, 1901).

Let P, Q be the two fixed points, PS, QS their distances from the focus of the parabola, PM and QN their perpendicular distances from the directrix of the parabola.

Since the parabola is to have its axis always parallel to a given straight line, its directrix will always be parallel to a line at right angles to this given straight line. Now, if we have two fixed points, the difference of their perpendicular distances from each of a series of parallel straight lines is obviously constant. Therefore PM − QN is constant. But in the para-

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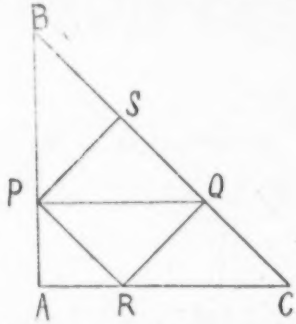
bola, PM = PS, and QN = QS. Therefore PS − QS is constant. Hence the focus S of the parabola is always so situated that the difference of its distances from the two given fixed points P and Q is constant. Therefore, by a well-known property of the hyperbola, S must lie on a hyperbola of which P and Q are the foci.

Chaos.—ABC is an isosceles triangle having a right angle at A, and P is a point in the side AB. Show how to inscribe in ABC an isosceles triangle having a right angle at P. Find under what circumstances an angular point of the triangle will be in CA produced. (S. and A., Stage II., 1903.)



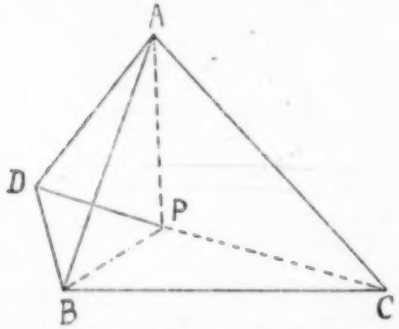
Draw PQ parallel to AC, meeting BC in Q. Draw QR at right angles to BC, meeting CA in R. Join RP. Draw PS at right angles to PR, meeting BC in S. Then, if RS be joined, PRS is the required triangle.

Because PQ is parallel to AC, therefore ∠ PQB = ∠ ACB = half a right angle. But ∠ BQR is a right angle. Therefore ∠ PQR is half a right angle.

Again, because PQ is parallel to AC, therefore the ∠ BPQ = ∠ BAC = a right angle. And the ∠ RPS is a right angle (constr.). Therefore the ∠ RPQ is equal to the ∠ SPB. And the ∠ ABS is half a right angle. Therefore in the triangles PQR, PBS, the angles PQR, RPQ are equal to the angles PBS, SPB each to each; and the side PQ is equal to the side PB, because each of the angles PBQ, PQB is half a right angle; therefore the triangles PQR, PBS are equal in every respect (Euclid I. 26). Hence PR is equal to PS. Therefore if RS be joined, an isosceles triangle PRS has been inscribed in ABC, having a right angle at P.

If PA be greater than PB, then R will be in CA produced.

S. and A.—In the plane of the triangle ABC, and on the same side of BC as the angle A, take a point P such that the angle BPC = 90° + A; if PA, PB, PC be denoted by α, β, γ respectively, show that $a^2\alpha^2 = b^2\beta^2 + c^2\gamma^2$. (Stage III., 1900.)



Make ∠ PBD = ∠ ABC, and ∠ BPD = ∠ ACB.

Then the triangles DBP, ABC are similar.

Therefore $\frac{PB}{BD} = \frac{CB}{BA}$. Hence $\frac{BD}{BA} = \frac{PB}{BC}$.

Again the ∠ PBD = the ∠ CBA. (Constr.)

Therefore the ∠ DBA = the ∠ PBC . . . . . (1).

Then, because in the triangles DBA, PBC the angles DBA, PBC are equal to one another, and $\frac{DB}{BA} = \frac{PB}{BC}$, therefore the triangles DBA, PBC are similar.

Hence $\frac{PD}{PB} = \frac{CA}{CB} = \frac{b}{a}$.

$\therefore PD = \frac{b}{a}$. $PB = \frac{b\beta}{a}$ . . . . . (2).

Again, $\frac{DA}{AB} = \frac{PC}{CB} = \frac{\gamma}{a}$.

$\therefore DA = \frac{\gamma}{a}$. $AB = \frac{C\gamma}{a}$ . . . . . (3).

We have seen that the ∠ BDA = the ∠ BPC, and the ∠ BDP = the ∠ BAC. Therefore the ∠ PDA = the ∠ BPC − ∠ BAC = 90°.

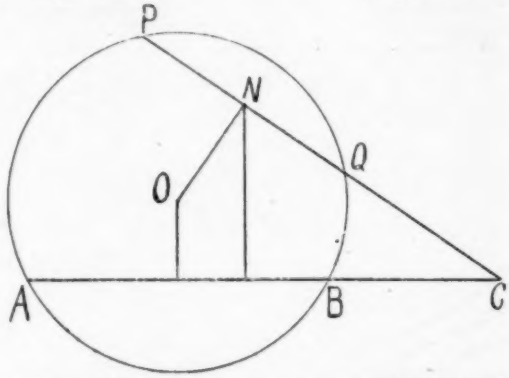
Therefore $PA^2 = PD^2 + DA^2$.

Therefore $a^2 = \frac{b^2\beta^2}{a^2} + \frac{c^2\gamma^2}{a^2}$.

Therefore $a^2\alpha^2 = b^2\beta^2 + c^2\gamma^2$.

Third Stage.—A, B, C are three points in order in a straight line, and P and Q are two distant points to the north of AC. At A and also at B an angle of 45° is subtended by PQ; at C, Q exactly covers P. Show that

PQ cos 2β + (a + 2b) sin β = ± cos $\beta\sqrt{\{(a + 2b)^2 - 4b(a + b)\cos 2\beta\}}$, where a, b, and β stand for AB, BC, and ACP respectively. (Stage III., 1904.)



Since PQ subtends equal angles at B and A, therefore P, Q, B, and A are concyclic. Let O be the centre of the circle PQBA. Draw ON perpendicular to PQ. Then since the angle subtended by PQ at O is a right angle, and ON bisects PQ at right angles, therefore each of the angles NOQ, NQO is 45°. Hence if R denote the radius of the circle, $ON = NQ = \frac{R}{\sqrt{2}}$.

Project CN, NO upon CA. Let h denote CQ.

Then $\left(h + \frac{R}{\sqrt{2}}\right)\cos\beta + \frac{R}{\sqrt{2}}\sin\beta = b + \frac{a}{2}$;

. or, $2\cos\beta\left(h + \frac{R}{\sqrt{2}}\right) + 2\sin\beta\frac{R}{\sqrt{2}} = 2b + a$ . . (1).

Also $h\left(h + \frac{2R}{\sqrt{2}}\right) = b(a + b)$ . . . . . (2).

Squaring both sides of (1), we have—

$4\cos^2\beta\left(h - \frac{R}{\sqrt{2}}\right)^2 = (2b + a - \sin\beta R\sqrt{2})^2$. (3).

Multiplying (2) by $4\cos^2\beta$, we have—

$4\cos^2\beta\left\{\left(h + \frac{R}{\sqrt{2}}\right)h\right\} = 4\cos^2\beta\{b(a + b)\}$. (4).

Subtracting (4) from (3), we have—

$2\cos^2\beta R^2 = (2b + a)^2 - 2(2b + a)\,R\sqrt{2}\sin\beta + 2R^2\sin^2\beta - 4\cos^2\beta\{b(a + b)\}$.

$\therefore 2R^2\cos^2 2\beta + 2R\sqrt{2}(a + 2b)\sin\beta\cos 2\beta + (a + 2b)^2\sin^2\beta$
$= (a + 2b)^2\cos 2\beta + (a + 2b)^2\sin^2\beta - 4b(a + b)\cos^2\beta\cos 2\beta$
$= (a + 2b)^2\cos^2\beta - 4b(a + b)\cos^2\beta\cos 2\beta$
$= \cos^2\beta\{(a + 2b)^2 - 4b(a + b)\cos 2\beta\}$.

$\therefore R\sqrt{2}\cos 2\beta + (a + 2b)\sin\beta = \pm\cos\beta\sqrt{\{(a + 2b)^2 - 4b(a + b)\cos 2\beta\}}$.

But $R\sqrt{2} = PQ$.

$\therefore PQ\cos 2\beta + (a + 2b)\sin\beta = \pm\cos\beta\sqrt{\{(a + 2b)^2 - 4b(a + b)\cos 2\beta\}}$.

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THE EDITOR'S TABLE

AMERICAN BOOK CO.

A Latin Grammar. By George M. Lane, Professor of Latin in Harvard University. Within our limits it is quite impossible to give an adequate review of this book. It is a scholarly compendium of Latin grammar and syntax, with the usual chapters on prosody and versification. Only those who are fair Latin scholars could ever feel the need of such a work as this, but those indeed would be able to appreciate the fullness of detail on the one hand, together with the exactness of reference on the other. Thousands of quotations whose sources are all given furnish a mine of wealth to the teacher or the student whose ideas soar a little beyond the plane of the examples given in the ordinary school grammar. We commend this book to the serious student of Latin as one which will enlighten him on the nicenies of the language, as well as clear up any doubtful points of grammar or syntax.

E. J. ARNOLD AND SON, LIMITED.

The "A.L." Artistic Brush-Drawing. Six Books. By May Mallam. We have had an infinite variety of brush-drawing guides, copy-books, and cards, either independent or combined with lessons on colour, number, nature study, etc.—some beautiful from an artistic point of view, but impracticable from a teacher's; others less ambitious, but containing "simple" strokes impossible of execution without a lot of "painting;" others, again, spoilt by trying to do two things at once. The present series confines itself strictly to brush-drawing, and contains nothing too difficult for an average boy who has worked steadily from the first copy. The graduation is good, the directions clear and to the point, and we can thoroughly recommend the set as equal to any and better than most of those in the market.

The "A.L." Sand Work, Drawing and Modelling. By Annie Wadsworth. There is a great advantage, as far as very young children are concerned, in drawing with practically non-resisting materials. For this reason the chalk is better than a pencil or pen, and sand is probably better than either for the babies class—the form is so readily drawn, and the surface so easily renewed. Free movement is cultivated just as well as when other mediums are used. Miss Wadsworth has compiled a very useful, interesting, and suggestive set of examples. We prefer "sand drawing" to "sand modelling," clay or plasticine being better for the latter work.

Kitty's Party. Our Pets. These two stories, which form Nos. 3 and 12 of the "A. L." Little Stories series of supplementary reading books, are written in language at once simple and enticing. The children who are fortunate enough to use them ought to be glad little things to have such an opportunity of learning to read so easily and in so entertaining a way.

A. AND C. BLACK.

Black's Guide Books: Belgium, with part of Holland; North France; The Rhine and the Moselle. Fifth Edition. This edition has been revised, amplified, and brought up to date by Mr. T. B. Ellery, F.R.G.S., and it is only just to say that the work has been exceedingly well done. His "suggestions" as to travel in Belgium are pithily put, and if followed should save the unwary traveller a large amount of trouble and some hard cash. Unless familiar with French, Mr. Ellery advises travellers to "stick to English." The Belgians are a patient people, even with those who take atrocious liberties with the language of the country. The *Guide* contains eight maps and fifteen plans, to say nothing of some admirable illustrations. The information as to routes is exceptionally full, and the traveller in Belgium should always be able to find his way about and visit all places of interest, provided he has this handy guide with him.

Another handbook in the same series on **Switzerland** is in every sense excellent. It contains the fullest information requisite for a tour in any part of Switzerland. Mr. Coolidge is an authority on all that concerns the Alpine districts, and in many respects this work is to be preferred to any yet published. The maps contained in the volume are of exceptional value, the letterpress is in large type, and the whole thing is very light in weight. An admirable supplement to meet the needs of cyclists is also included.

BURNS AND OATES.

Freehand Drawing of Ornament. By John Carroll. Drawing from outline copies of classical or renaissance ornament has been gradually going out of favour. No doubt it forms a severe trial of patience and helps to train the eye, but it is a melancholy exercise for all that.

In this book the author emphasises the forms by putting a tone over the background and by forcing the lines. He also gives sketches with each drawing to show the pupil how to proceed. On the whole, the selection is a very good one. Here and there (as in Nos. 16, 17, and 23) the spirals lack distinction and the construction is faulty, but for those who are compelled to practise this lifeless exercise for purposes of examination this book should be found useful.

CASSELL AND CO.

The Greek Heroes. A good selection from the heroic legends of Greece. The book is got up in durable style, and the print is bold and clear. We could have wished that the pronunciation of the names had been given—they might just as well be learned correctly as not; but we fear that every teacher will not take the trouble to look them up, and we are not all classical scholars. We should not ourselves describe the mountains of Greece as being "nearly as lofty as the Alps" (p. 55).

CHAPMAN AND HALL.

Stained Glass. By Lewis F. Day. This is one of the Art Handbooks issued by the authorities of South Kensington Museum, and is really a small edition of Mr. Day's more elaborate work published some time ago. No one is, of course, more competent to deal with this subject than the author. He treats the subject from a historical point of view in his well-known lucid style, and the book is brimful of information with respect to this most interesting branch of art. The illustrations, though they lack the charm of colour, which is the essence of all stained glass, yet serve to show the fitness of the design to the material. It is essentially a student's book, and is excellent in every way.

ARMAND COLIN, PARIS.

Pages Choisies des Grands Ecrivains.—Voltaire. Avec une Introduction par Francisque Vial. The present volume fully maintains the high character of the series of which it forms part. M. Vial's introduction is that of a critic who is fully competent for the task he has undertaken, and who sets about it without any *parti pris*. With Voltaire almost more than with any other writer, the man and his life explain his work. Though the position of Voltaire with regard to questions which have the deepest interest for humanity is better understood now in England than it was, there is still with us too great a disposition to regard him merely as a *frondeur*, who made a cocksby of revealed religion for the enjoyment of the sport it afforded him. Even those amongst us who do full justice to him as a writer whose prose exhibits in a high degree those qualities which we are accuatomed to associate with the prose of his nation, and who, as a poet, is always worth reading, have only a vague idea of his philosophy, and know still less of his humanitarian work. M. Vial specially devotes himself to an explanation of Voltaire's philosophical position, and to his work for his fellow-men. That Voltaire was a deist, and that he argued for the existence of a God who rewards and punishes, most well-informed Englishmen now know; but it will come as a surprise to many of us to know that a great French critic of the present day reproaches him with being "insolemment aristocrate et monarchiste." Many passages could be cited from Voltaire's writings to show that this opinion of him is hardly correct. But if any doubt is admitted as to his political philosophy, there is no doubt that his social philosophy is, in the words of M. Vial, "toute pénétrée de justice et d'humanité." If he had done nothing else than denounce with all the ability of which he was capable the iniquitous treatment of Calas, Sirven, Martin, and the Chevalier de la Barre, he would have been entitled to the lasting gratitude of humanity. The extracts given from Voltaire's writings fill nearly four hundred pages, and give a very complete idea of his varied literary activity. Those from his works on philosophy, morals, and religion are particularly full and well chosen, and those

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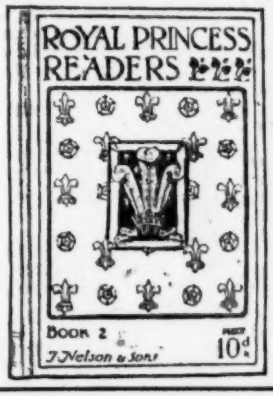

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Macaulay's Life of Samuel Johnson. Edited by C. L. Hanson. No better advice can be given to one who, having mastered the rudiments of English composition, requires to acquire some of the graces of style, than to study such masters of prose as Macaulay, De Quincey, or Addison. The best section of the editor's work in this book is that part of the introduction dealing with this feature of Macaulay's writing. Too much importance cannot be given to this matter of treating literature in schools as literature and less as examination matter. Valuable hints are given as to the divisions of the subject, the paragraph, the sentence; their order, variety, connection, and sequence—matters which tax the teacher's powers much more than the mere knowledge of references and that kind of thing, but which at the same time reward one's energies far more.

The book also contains a biographical account of Macaulay, a list of the works of Johnson and some of his contemporaries, and full, clear notes on persons and places mentioned, and the usual notes of reference.

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La Gondole Fantôme (1797). Par Gustave Toudouze. Ouvrage illustré de 52 gravures dessinées par Vogel.

L'Eau Dormante. Par Blanche Legrand. Roman illustré de 54 gravures d'après Ed. Monchablon. (Petite Bibliothèque de la Famille.)

La Mission de Geneviève. Par B. A. Jeanroy. Ouvrage illustré de 52 vignettes dessinées par Tofani.

Une Dette de Cœur. Par Julie Borius. Ouvrage illustré de 42 gravures.

Malheur est Bon. Par Danielle D'Arthez. Ouvrage illustré de 48 gravures d'après Ed. Zier.

Le Petit Léveillé. Par Albert Cim. Ouvrage illustré de 24 gravures d'après Tofani.

La Louisiane. Par Eugène Guénin, Laureat d'Académie Française. Ouvrage illustré de 68 gravures et 2 cartes.

Je le Veux! Par Mme. Chéron de la Bruyère. Ouvrage illustré de 36 vignettes par Tofani. (Bibliothèque Rose Illustrée.)

Belles Dames en Grandes Toilettes. Série de Découpages. Texte de Aristide Fabre. Illustrations de Job.

Les Adventures de Jeannot Lapin. Texte de Mme. F. W. Dawson. Illustrations de R. de la Nézière.

For sumptuousness of appearance without and within, nothing in the way of juvenile literature produced on this side of the Channel can compare with the issues of Messrs. Hachette, and those who have the task of selecting prize-books or presents for young relatives could not do better than see the various books of the above list, if some little knowledge of the French tongue is among the accomplishments of the boy or the girl for whom the book is being selected. The annual volume of *Mon Journal* is as usual full of all that is good in a journal for the young—stories, pictures, jokes, and all sorts of miscellaneous matter. For a girl of somewhat more mature years, the charming tale of *L'Eau Dormante*, with its rich pictures of the scenery and the habits of Southern France, is specially appropriate. *La Mission de Geneviève* is another very attractive tale of the domestic affections. Boys will find *La Gondole Fantôme* full of mystery and adventure, the scene being laid in Venice during the troublous time of the French Revolution. Then come a group of five stories which will suit our younger boys admirably. They are for the most part told in a simple and direct style which ought not to be beyond the power of those in their second or third year in the study of French. The last on the list is more of a nursery book, which will have to be read to our youngest students. A special word is due regarding *Belles Dames en Grandes Toilettes*, which is a series of those clever exercises in cutting out figures and costumes that afford pleasant work for little fingers on a rainy day, and at the same time give a very practical knowledge of the types of costume which have marked the past centuries. There is treasure-trove in the parcel under review for those who know a little French, and a pleasant stimulus for the learning of more.

JARROLD AND SONS.

The King's English, and How to Write it. By J. Bygott and A. J. Lawford Jones. The book is evidently written as a help to success in passing such examinations as the London Matriculation or the various Civil Service examinations. The authors show that they have much experience in preparing for these tests, and give the benefit of their knowledge to the tyro. Most of their advice is very good, and the examples they give as tests are excellently chosen. The sections on composition and précis writing are carefully and usefully written; but in the former a list of authors to be read as likely to induce purity of style gives a paragraph to Hazlitt and a line or so to the Bible and Shakespeare, while no mention is made of any poetical works.

Under the head of paraphrasing a method is suggested which we consider far too elaborate for practical purposes, and we do not know whether to wonder at or blame the authors who paraphrase about fifty lines of Shakespeare's fine prophecy of Queen Elizabeth from *Henry the Eighth* into fifteen lines of rather bald prose.

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UNIVERSITY TUTORIAL PRESS.

Chaucer: Prologue and Squire's Tale. A. J. Wyatt, M.A. This is a very thorough and masterly edition of the poems. Good editions have appeared before, but we know of none so complete as this. Very careful work is needed in the annotation, and an extensive knowledge of many little known works of the fourteenth century, to elucidate the references in the "Squire's Tale," and certainly Mr. Wyatt has spared no pains. The author also gives great help to the understanding of the scansion of the poetry and the quality of the vowels, thus taking away from the work the unmerited stigma of roughness of metre. The biographical and historical notes are full. Students will find the paragraph on Chaucer's final "e" very useful.

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